

FINAL REPORT

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Study S-32

RECREATIONAL USE SURVEY OF MISSOURI RIVER

Missouri Department of Conservation

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TABLE OF CONTENTS

	Page
ABSTRACT	i
INTRODUCTION	1
DESCRIPTION OF STUDY AREA	2
THE STUDY SEGMENTS	6
Segment A (River miles 0-144)	6
Segment B (River miles 144-260)	6
Segment C (River miles 260-423)	7
Segment D (River miles 423-553)	7
MATERIALS AND METHODS	8
RESULTS	13
B SEGMENT OF MISSOURI RIVER	13
Recreational Use	13
User Characteristics	17
C SEGMENT OF MISSOURI RIVER	18
Recreational Use	18
User Characteristics	22
D SEGMENT OF MISSOURI RIVER	23
Recreational Use	23
User Characteristics	27
A SEGMENT OF MISSOURI RIVER	28
Recreational Use	28
User Characteristics	31
ESTIMATED ANNUAL RECREATIONAL USE AND NET CONSUMER'S SURPLUS ON THE ENTIRE AREA	32
DISCUSSION	34
ACKNOWLEDGMENT	45
LITERATURE CITED	46
APPENDICES	52

DEDICATION

Humbly, to my census clerks, the 108 men and women (all temporary employees), who for 37 years of field work in nearly every part of our state and in the contiguous waters of Illinois, Kansas and Nebraska, have made some of my surveys look fairly good at times.

ABSTRACT

Recreational use of 553 miles of the Missouri River (from its confluence with the Mississippi River to the Missouri-Iowa line) and a narrow adjacent band of land was determined over a 4-year period (Aug. 1983--Aug. 1987).

For convenience in surveying, the river study area was divided into four segments, A-D. The types and amounts (in terms of visits and hours) of recreation on each segment were monitored for one year, using a non-uniform probability survey method. Direct counts were also obtained for some sites (such as Indian Cave State Park, Nebraska). The survey results, including direct counts, were extrapolated to produce an estimate of the amount of recreational use on each segment. Since each segment was monitored for only one of the four years, two control sites (one on A segment and one on B segment) were surveyed all four years to estimate changes in use over the entire survey period.

A total of 61,890 personal interviews were conducted at 67 stations on the four segments. Forty different recreational uses were identified, from popular activities such as fishing and boating to specialized pursuits such as nature study and rappelling.

The survey showed that total recreational use (land and water) was greatest on the D segment (river miles 423-553), with 236,930 visits and 1,123,750 hours of use. Recreational use was lower on the other three downstream segments, ranging from 109,590 to 139,970 visits, and from 626,290 to 656,340 hours.

Fishing, which included fishing by pole-and-line and a variety of other sport and commercial methods, was the most popular activity on all except the D segment. (The heavy use of Indian Cave State Park on D segment influenced the position of fishing in relation to other activities.) Fishing was the

activity pursued during 31-40% of the visits and 63-65% of the hours. By far the most popular form was pole-and-line fishing, followed by trotline fishing-for-sport and hoopnetting, these three together accounting for 39% of visits and 61% of hours on the entire 553 miles.

Fishing pressure was highest--27 hours per acre--on B segment (river miles 144-250), and ranged from 12 to 22 hours per acre on the other three segments. Catch rates for all methods combined (pole and line, trotline commercial, trotline sport, hoop net, trammel net) ranged from 0.16 fish per hour on B segment to 0.36 fish per hour on D segment.

Hunting in the narrow band of land next to the river was also an important activity. The lowest hunting intensity (9 visits per mile) occurred on D segment, and the highest on B segment (62 visits per mile). Deer, squirrel, dove and waterfowl were commonly hunted along the river.

Other important uses were camping (very important in all segments, mostly on non-Department sites), boating, sightseeing, picnicking and passive leisure.

This study revealed the importance of Department of Conservation access sites to recreationists on the Missouri River. Approximately 32% of the total visits and 29% of the total hours expended were at the 23 Department sites. Average annual use at the 23 Department sites was 7,990 visits, an average of 21 persons per day, per site. The 41 non-Department-owned sites (exclusive of sites where direct counts were used) had 6,150 visits annually, or an average of 23% less than the Department sites.

A majority of the recreationists, ranging from 81% to 83% in the four segments, traveled less than 25 miles, and 22-43% traveled 5 miles or less to reach an access on the 553-mile stretch. Only about 1% of the recreationists traveled 500 miles or more, reflecting the use of this resource by local

visitors. Once on the water, the large majority interviewed (80-91%) traveled less than one mile from their access point.

Net consumer surplus value for the B segment (116 miles) was \$406,160. Extrapolation of that amount for the entire 553 miles yielded an estimate of \$1,936,000 for annual net benefits.

Estimated total recreational use of the 553 miles (derived from data collected at control sites) varied widely from year to year, and this variation appeared connected with water level. Total use was low the first year of the survey--about 490,570 visits and 2,487,000 hours--when high water conditions prevailed from April through August, the peak recreation period. The following three years had more normal water levels and higher recreational use. Recreational visits increased 9% over the 4-year period, but total hours decreased 2% overall.

This study provides the first quantitative information about recreational use on the Missouri River. It shows clearly that the Missouri River and its land corridor constitute an important and heavily used recreation area. The resource agencies responsible for developing management plans for the Missouri River should consider its unique attributes, and strive to protect it in the face of increasing population growth and the threat of environmental damage.

INTRODUCTION

Recreational use of 553 miles of the Missouri River in Missouri, including the portions contiguous to Kansas and Nebraska, was determined during a 4-year study. The purpose of this study was to provide resource data for state and federal agencies responsible for resource planning, so they will be better able to evaluate the effects of proposed projects upon river-oriented recreation in the study area.

Although the Missouri River has already been extensively altered by channelization, additional proposals have been made by various agencies that may have significant detrimental effects on the remaining resource and on recreational use of the basin. Of major concern are the various proposals to divert water from the Missouri River basin (Missouri Basin States Association 1982). The larger proposals call for diversions of 1-5 million acre-feet per year to Texas, Oklahoma and New Mexico; 2-6.2 million acre-feet to Colorado; and up to 6 million acre-feet per year to western Kansas, all primarily for irrigation. Proposals also exist for using smaller amounts of water for transportation of coal in a slurry pipeline. One water diversion project, proposed by South Dakota, was stopped by a 1988 8-0 Supreme Court decision. Several more such projects have not been resolved.

Relatively few studies have been conducted on the Missouri River and most have dealt with habitat evaluation (Robinson 1973, Burke and Robinson 1979, Robinson 1980a), fish population evaluations (Fisher 1962, Ragland and Robinson 1972, Robinson 1982a), the sport fish harvest (Funk 1969), and commercial fishing (Robinson 1982a, Robinson 1982b). The only information on recreational use was a base line data study from Rulo, Nebraska, to the mouth (498.4 miles), by Gillespie and Lind (1974).

The Missouri River was ranked first in terms of future recreational potential in a study of the 38 major watersheds in Missouri (Bachant and Martindale 1982). In response to recent interest, an excellent guidebook on the river has been published by the Missouri Department of Natural Resources. However, accurate information on the quality, type, and economic value of recreation on the Missouri River is needed for good resource management. This study was designed to gather this information.

DESCRIPTION OF STUDY AREA

The study area encompassed 553 miles of stream, and an approximate 100-foot corridor of land on each side of the stream, from the confluence with the Mississippi (mile 0) to the Missouri-Iowa line (Fig. 1). The total area surveyed was 81,480 acres (68,075 water and 13,405 adjacent riparian habitat), which comprises about 127.3 square miles. The amount of recreational land and water area surveyed was about 147 acres per mile of stream.

MISSOURI RIVER BASIN

Geography and Geology

The Missouri River is the longest river in the United States. Its length from the farthest head stream is 2,714 miles. The length of the Missouri stretch is 553 miles, about 20% of its entire distance. The Missouri River carves its way through seven large states to form a basin of 529,350 square miles (Gresswell and Huxley 1965). The actual drainage area of the Missouri River in Missouri is 8,200 square miles, but the additional area contributed by nine more of the 38 major watersheds in Missouri brings the total to 37,786 square miles (Missouri Department of Natural Resources 1986). The Missouri River basin includes 54% of the 69,097 square miles within the state.

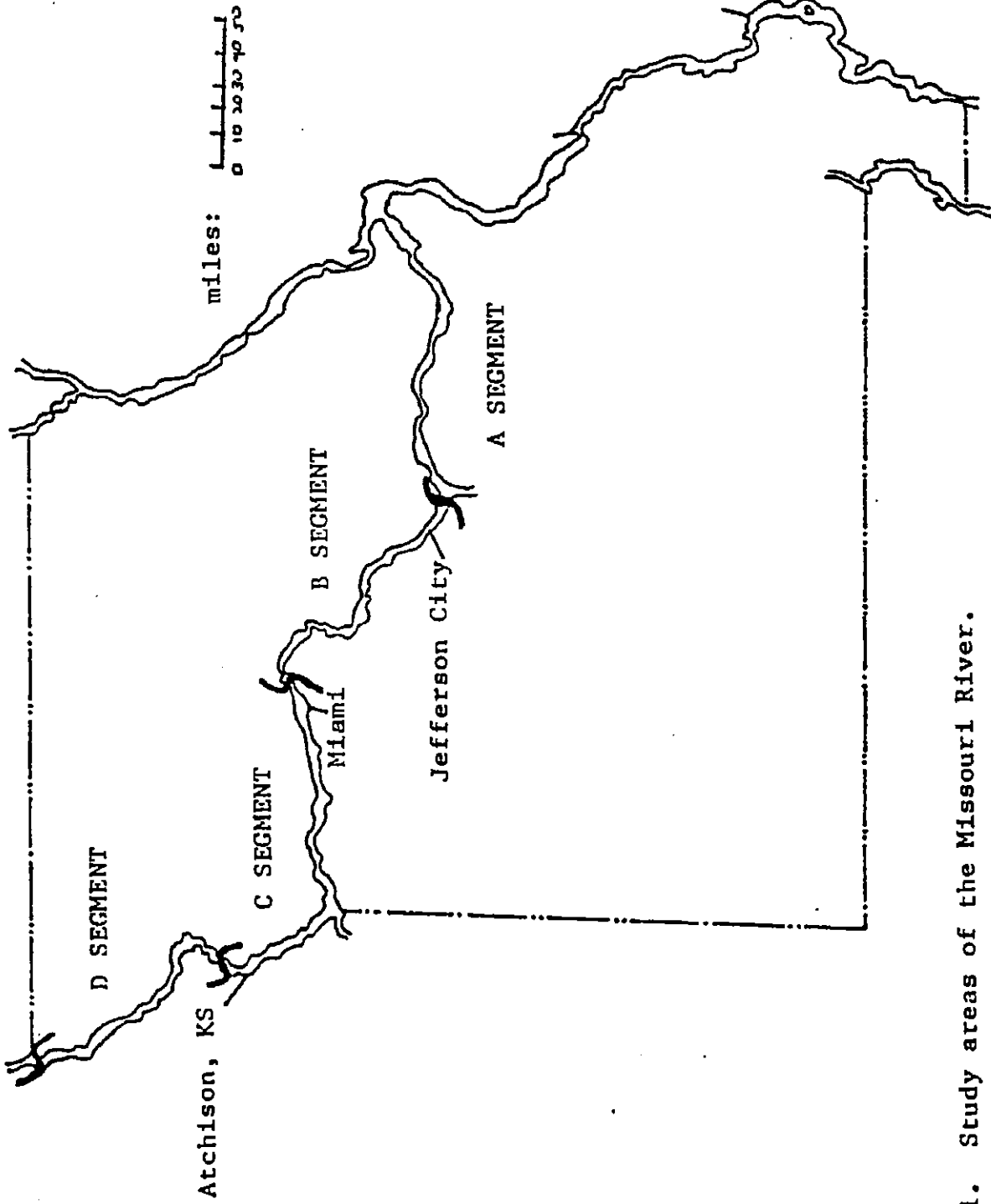


Figure 1. Study areas of the Missouri River.

In Missouri, there is uniformity in the soil type found in the wide flood plain. It is alluvium only, and marks the southern reach of the inferred line of glaciation. The variable, silt-laden Missouri River runs through a series of eight natural regions in Missouri. The physical characteristics of these natural regions are the result not only of glaciation, but also of several prehistoric seas. One example of how conditions in the past affected the river's present-day structure can be observed in the dolomite rock along the river, formed by a thick layer of sediment containing magnesium and calcium carbonate deposited by the oldest sea (Ordovician). Spectacular bluffs from river mile 158 (in B segment) to near Howell Island (river mile 49 in A segment) are of this rock.

Pierce (1983) gives a wonderful description of the eight natural regions along the Missouri River. They are as follows: (1) loess mounds region (river miles 553-460); (2) Missouri Platte region (river miles 460-342), an area where limestone beds are visible in places from Parkville to below Kansas City; (3) broad bottoms region (river miles 342-263), an area where the flood plain is as much as 10 miles wide; (4) Booneslick region (river miles 263-186), characterized by moderately tall limestone bluffs and a large number of salt springs or "salt licks"; (5) White Cliffs region (river miles 186-158), characterized by tall Burlington limestone bluffs that are rich in fossils; (6) Rhineland (river miles 158-49), a region of heavy German immigration because of its similarity to the Rhine and Moselle River areas, bordered by erosion-resistant dolomite and with a flood plain that averages not over 3 miles in width; (7) river-breaks region (river miles 49-25), where extensive shale formations form slopes with deeply forested and deeply cut valleys; and (8) Portage Des Sioux region (river miles 25-0), where the flood plains of the Missouri and Mississippi rivers unite.

River Alterations

The Missouri River has been severely channelized since before the turn of the century (Funk and Robinson 1974). In their survey, using a U.S. Army Corps of Engineers report, Funk and Robinson found that the distance from Rulo to the mouth (all in the Kansas City district) had been shortened from 544 miles in 1879 to 498.4 miles in 1972, a decrease of more than 8%. The total water surface area in 1879 was 121,739 acres; in 1954 it was 71,151 acres, a loss of 50,588 acres. Loss was due to construction by diking and also to cutting off meanders by dredging. The Museum of Missouri River History at Brownsville, Nebraska, is housed in the retired dredge Meriwether Lewis, whose first assignment was to double cut through the Cambridge Bend at Glasgow, Missouri (between stations 3 and 5, upper section of B segment, Fig. 2).

My measurement for the water area (68,075 acres) included the 54.6 miles of stream from Rulo, Nebraska, to the Missouri-Iowa line (Omaha District C.O.E.) as well as the 498.4 miles included in the Funk and Robinson paper.

Flow and Turbidity

The Missouri River has forever been subject to great variations in its flow regime. Fortunately, the U.S. Geological Survey has maintained records of discharge in gage-heights, which are converted into cubic feet per second (c.f.s.). Some idea of water regimes can be seen from records at Hermann, Missouri (river mile 98), where monitoring was begun in October 1897 (United States Department of the Interior, 1983). These records for the 90-year period (through September 1987) show that minimum flow was 4,200 second-feet for a 3-day period in 1940. Maximum discharge of 676,000 second-feet occurred in 1903. One extreme that fell outside the 90-year period of record was the flood of 1844, when a discharge of 892,000 second-feet was computed by the

U.S. Army Corps of Engineers. The average discharge for the 90-year period of record was 81,740 second-feet, or 59,221,000 acre-feet, per year. This amount of flow would annually cover an area one-and-one-third times the size of Missouri to a depth of one foot.

Water volume at Rulo, Nebraska (river mile 498), based on 38 years of gage-height data, gave an average annual discharge of 41,740 second-feet, about 51% of the average annual discharge at Hermann, Missouri.

The Missouri River is familiarly known as the Big Muddy throughout our nation. Sediment loads were high in prehistoric times, and agricultural practices and other activities have increased the amount of sedimentation in the period which saw the introduction of improved farm machinery. However, since the construction of six main stem reservoirs, from Lewis and Clark in South Dakota to Fort Peck in Montana, turbidities have been reduced. A survey of water quality data collected at a Jefferson City monitoring station from 1969 to 1975 showed that turbidities in Jackson Units ranged from a minimum of 10 (it's a miracle) to a maximum of 1,600, and averaged 315 (Kansas City District Corps of Engineers 1981). Total hardness in mg/l averaged 235 over the 6-year record period.

River Fauna

Changes in types of faunal species as well as in numbers of species have been documented by Pflieger and Grace (1987). Both the Missouri and the Mississippi rivers are inhabited by a distinct assemblage of fishes, which have been named the Big River faunal group by Pflieger (1971). Although the species combination varies considerably, the fundamental unity of the Big River faunal system is indicated by distribution of such fishes as shovelnose sturgeon, silver sucker and chub. In the most recent period of collection,

1978-1983, a total of 65 species were recorded, almost as many as were noted in the collection period 1962-1972, when 67 species were found. There is continued enrichment of Missouri River fish fauna by stragglers from tributaries. For example, spotted bass were restricted to the Osage drainage in the early 1940s, but are now present in the Missouri River as well as in other tributaries to the main stem. Recent additions to the fish fauna include silver carp and big head carp.

THE STUDY SEGMENTS

The 553 miles of stream and adjacent land studied were divided into four major segments and each segment was divided into two or three sections (Figs. 2, 3, 4, 5, 6). Subdividing was done for ease of planning and administering the survey. Each segment was surveyed for 1 year.

A Segment of Missouri River

This area included 144 miles, from the confluence with the Mississippi River to Jefferson City (Fig. 6). Recreational use was estimated on 23,585 acres of water and 3,491 acres of land. The average area surveyed was about 188 acres per mile of stream. Departing users were interviewed at six public and private sites and eight Department access areas. (One public site, 367 Highway Bridge in north St. Louis County, was found to be unsatisfactory and little used because of heavy gravel hauling activity, and was dropped from our survey after the first week of sampling.) There is an average distance of 10.3 miles between each access site on the 144-mile segment.

B Segment of Missouri River

This area encompassed 116 miles from Jefferson City to near Miami (Fig. 2). The area included all known access sites between river miles 144 and 260.

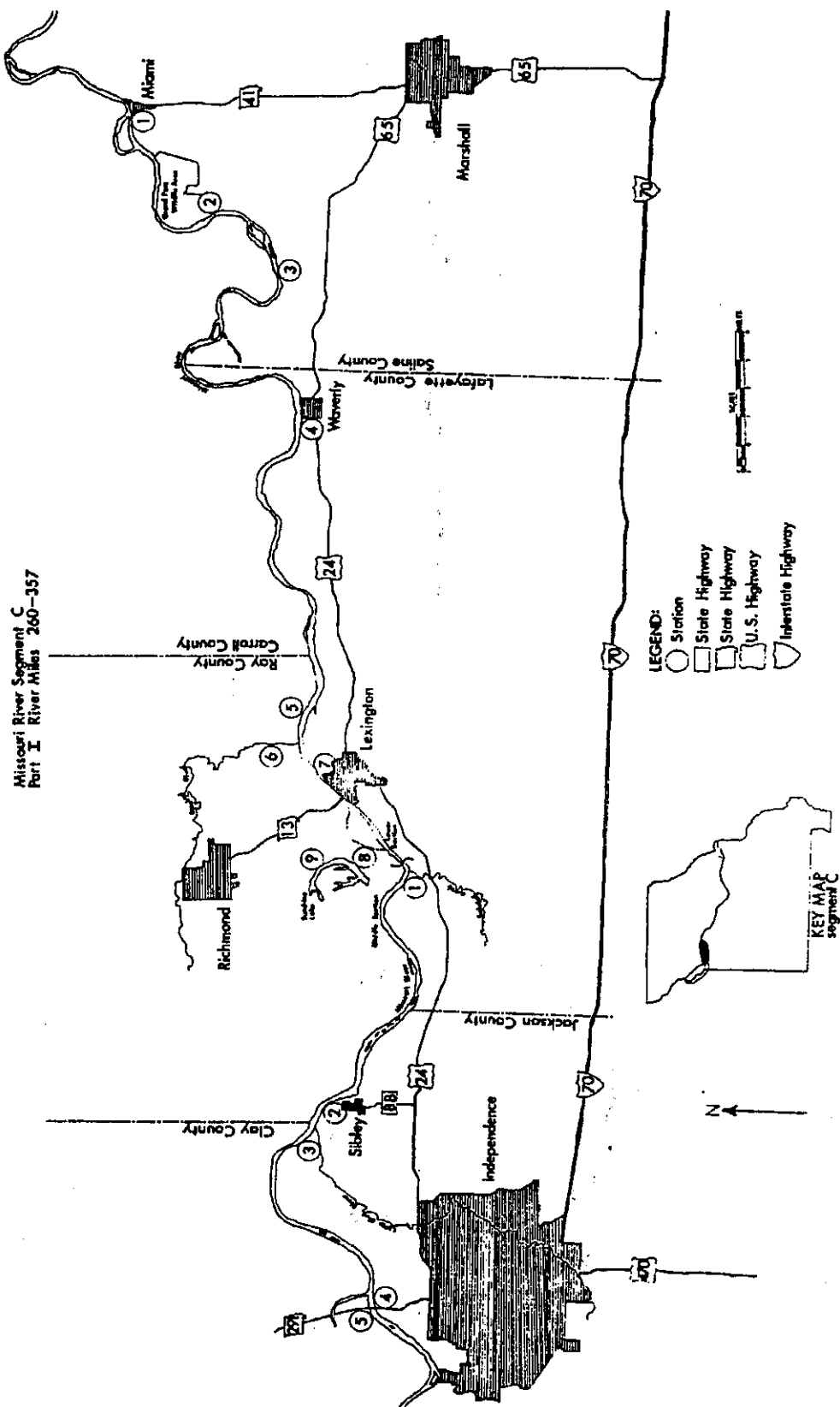


Figure 3. River miles 260-357 of C segment, Missouri River.

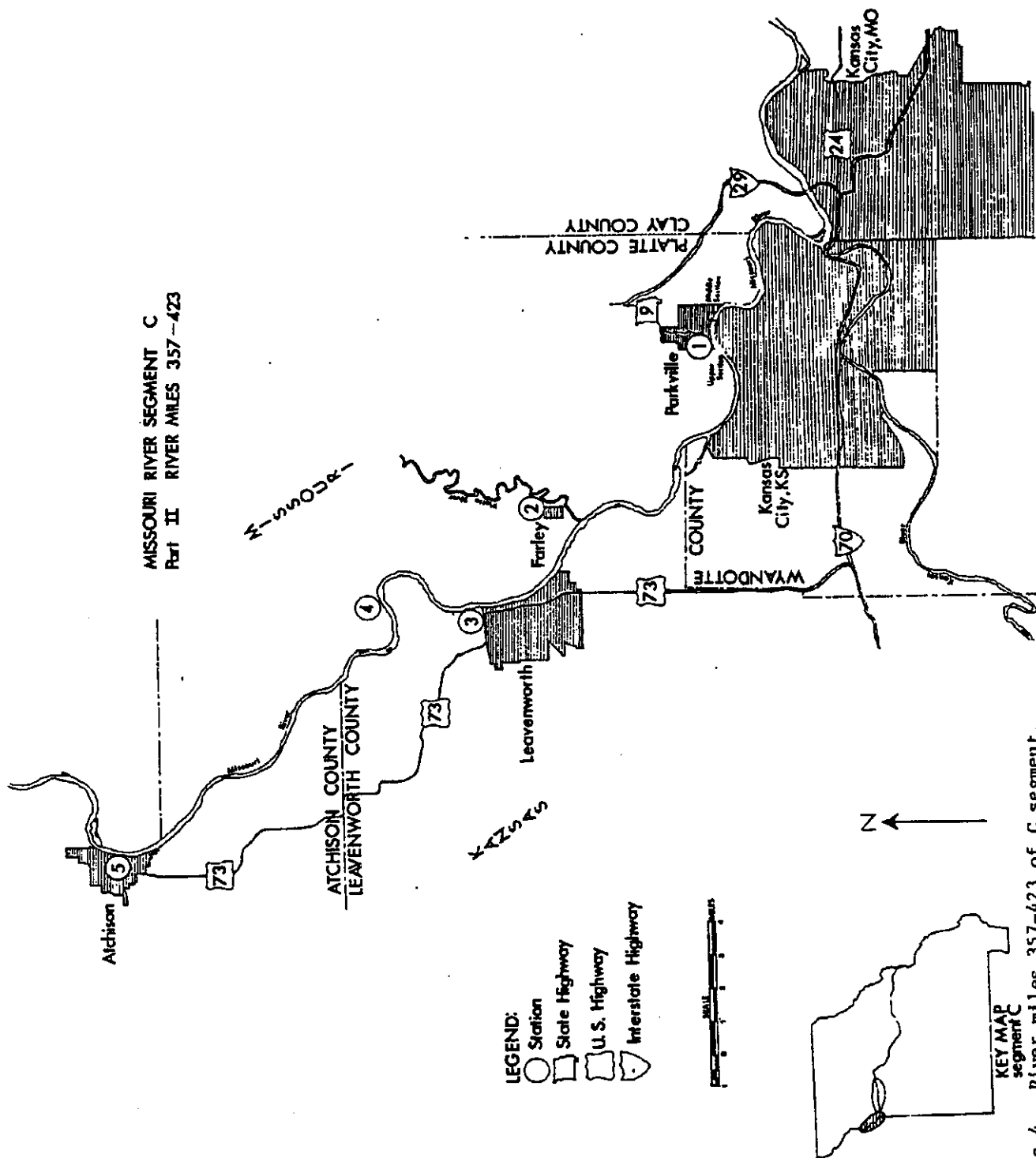


Figure 4. River miles 357-423 of C segment, Missouri River.

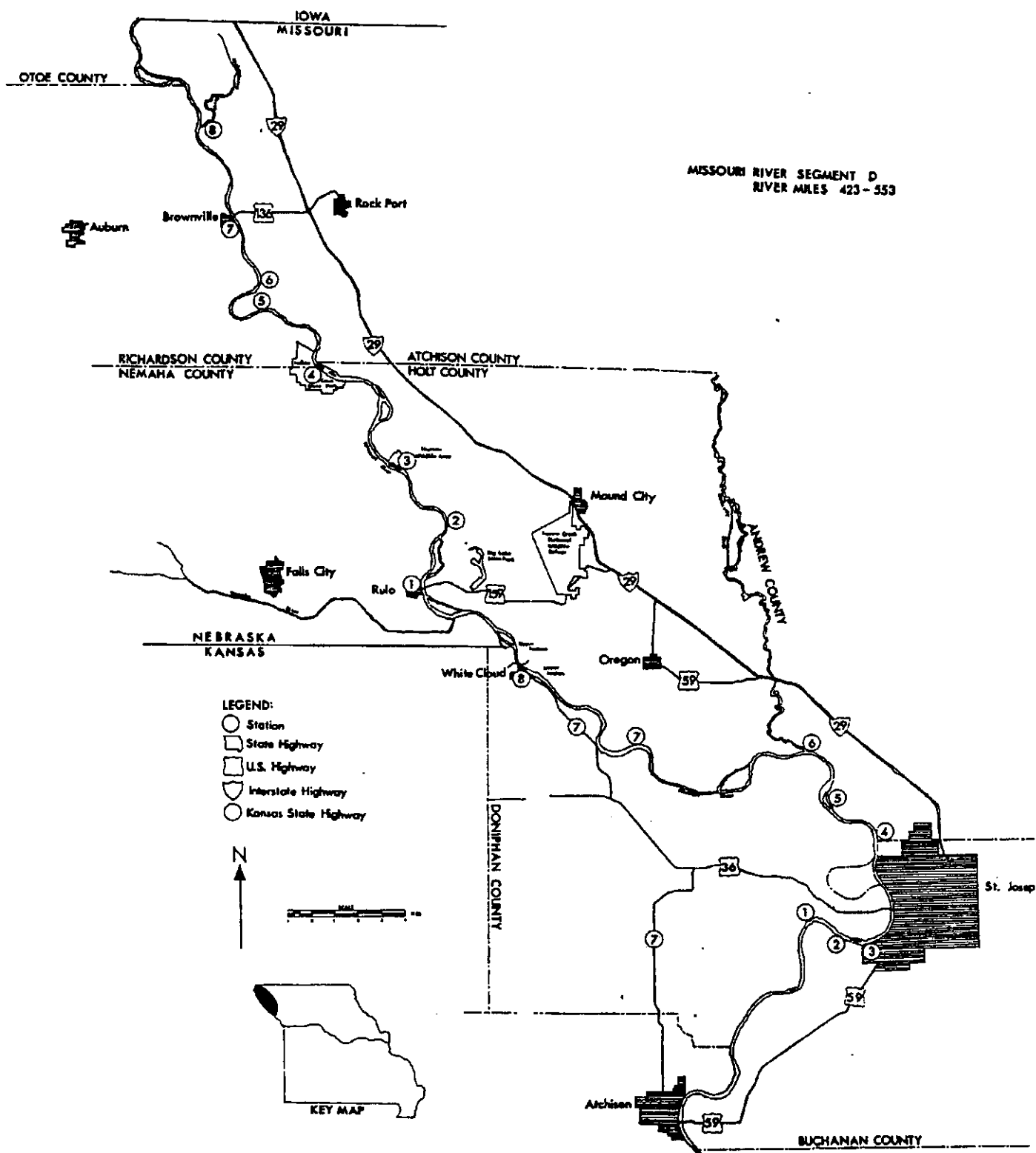


Figure 5. D segment (river miles 423-553) of Missouri River.

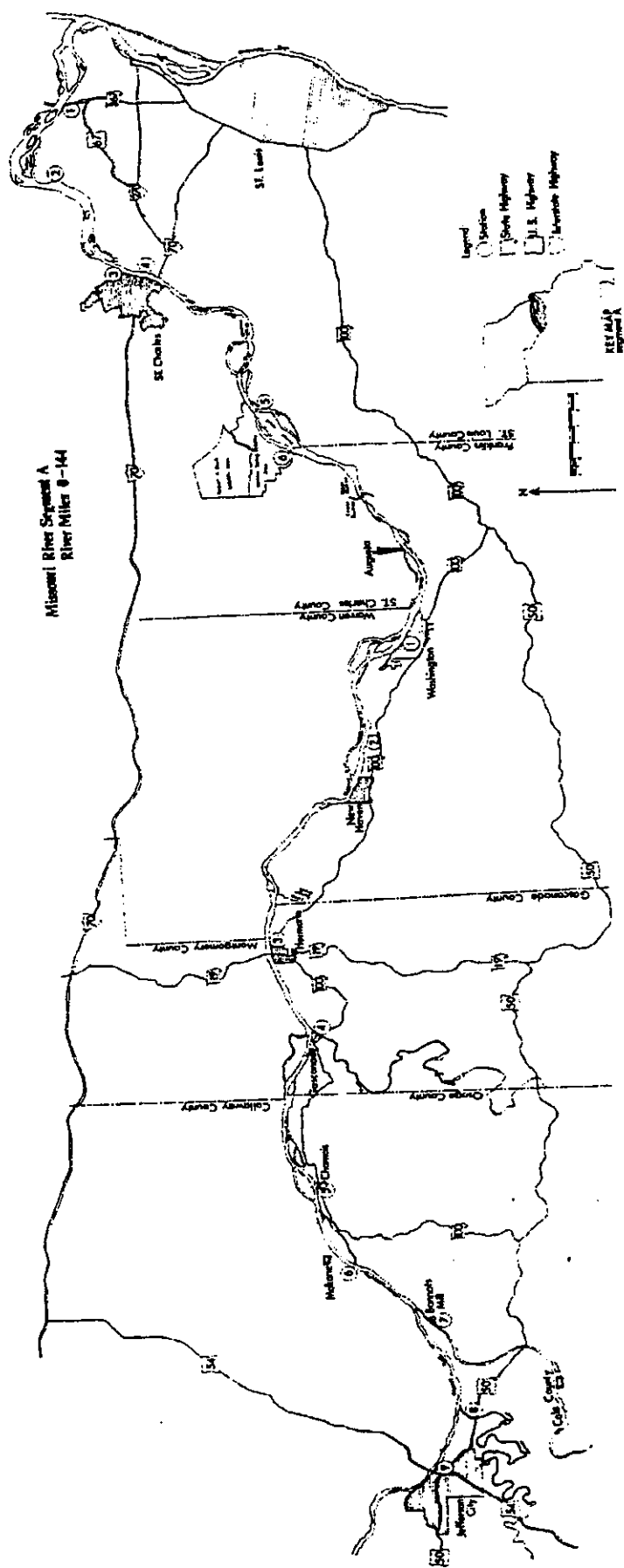


Figure 6. A segment (river miles 0-144) of Missouri River.

An estimated 14,946 acres of water and 2,812 acres of land were surveyed. The average area surveyed was about 153 acres per mile of stream.

We surveyed 13 private and public accesses on the B segment. Six Department of Conservation sites were present in the 116-mile stretch. The average distance between each access site on B segment was 6.4 miles.

One of the heaviest seasonal concentrations of use at a non-Department site was the waterfowl hunting activity of Palmer Creek (Figure 2, No. 7 for the upper section, and Appendix C). We designed our exiting check stations in this vicinity to obtain use data from the renowned Dalton Cutoff, one of Missouri's most heavily developed waterfowl hunting areas.

C Segment of Missouri River

This segment, 163 miles in length, extended from river mile 260 to river mile 423 (Fig. 3, 4). An estimated 18,142 acres of water and 3,951 acres of land were surveyed. The average area surveyed was about 135 acres per mile of stream.

On this most extensive segment, we surveyed 16 public and private sites. Only three Department sites were present on this stretch; one of these, Schimmel City, is on the Platte River near its confluence with the Missouri River. It was heavily used as access to the Missouri River by boaters and all types of fishermen. It was also the takeout point for several large parties of canoeists. The average distance between any of the types of accesses included in the survey was 8.6 miles.

D Segment of Missouri River

The D segment was 130 miles in length, and extended from river mile 423 to the Missouri-Iowa line at river mile 553 (Fig. 5). Recreational use for

the 130-mile stretch was estimated on 11,402 acres of water and 3,151 acres of land. The average area surveyed was about 112 acres per mile.

Survey clerks interviewed recreationists at six public and private sites and six sites owned by the Missouri Department of Conservation. In addition, one site, Indian Cave State Park (Fig. 5, No. 4 in upper section), was included in the survey. Park personnel furnished us with complete records of recreational use activities, and this data was included together with use estimates from the 12 survey sites. There was an average distance of 10.0 miles between each of the sites (13) in this segment.

MATERIALS AND METHODS

Recreational use on the 553 miles of study stream and the border strips of adjacent land was estimated by extrapolating results of interviews carried out on a randomly scheduled basis from 1983-1987 at selected access sites (hereafter referred to as stations). Detailed methods of sampling and extrapolation were modified from those by Fleener (1971a). The area was divided into four segments and each segment was surveyed for 1 year. The study segments and survey schedules were: Segment B (river miles 144-260), August 28, 1983, to August 25, 1984; Segment C (river miles 260-423), August 26, 1984, to August 24, 1985; Segment D (river miles 423-553), August 25, 1985, to August 23, 1986; and Segment A (river miles 0-144), August 24, 1986, to August 22, 1987.

Sampling stations were selected on the basis of known recreational use and were at bridge crossings, at ends of roads (in some cases levee roads), and on private land where the survey clerks could easily stop and interview recreationists. All developed Missouri Department of Conservation public access sites were surveyed and the results tabulated separately to provide site-specific estimates of amount and kind of use.

Trained clerks interviewed departing recreationists during an 8-hour period on randomly selected days and asked them to enumerate all recreational activities they participated in during their visit. The hour-periods 0000-0800, 0800-1600, and 1600-2359 were labeled A, B, and C respectively, and were selected on the basis of probable use (Appendix 0). Experience gained from other surveys showed that probable use during those periods can be accurately predicted. The figures for the Missouri River survey more nearly reflect actual use than in any previous surveys.

Three seasonal periods were defined for the study: fall, 17 weeks between late August and late December; winter, 11 weeks between late December and mid-March; and spring and summer, 24 weeks between mid-March and late August.

I changed the frequency of interviews at particular stations if use changed from that originally predicted when the sampling schedules were made. Adjustments were also made for season of year. For example, most stations had heavy use in the 24-week spring and summer period, but much lighter activity in the fall. I found that some stations were unusable in the winter period due to bad road conditions. Some low-lying roads were also affected by spring floods for several days. I also determined that a few of the accesses on small streams adjacent to the Missouri River were changed so much that I had to change the seasonal probabilities a great deal. An example of this is the Sniabar River access at Wellington (Station No. 1, Appendices G, H, I). By monitoring the various changes that affected recreational use at any given station, I was able to minimize the standard errors associated with seasonal estimates of use.

An important development in sampling, first used in the survey of Grand River (Fleener 1977), was used to advantage in the Missouri River survey.

During the process of random drawings for the interview schedules, it was often possible to draw twice the same day for any particular station. Rather than interviewing two times, we did it once and used the information collected twice. In addition to improving the standard error of the whole week in which the double sample was drawn, this procedure also saved money. The savings during this survey amounted to 480 man-days of salary from sampling only once rather than twice.

Because the survey was scheduled over a 4-year period, I selected two control stations that would be sampled each year to provide data on changes in use that might be due to environmental or socio-economic changes. The Providence and Gasconade Park Department access (Fig. 2, station No. 5 in the lower section of the B segment, and Fig. 6, station No. 4 in the upper section of the A segment) were chosen as the control sites. Some special implications regarding the use of two control sites are mentioned in the Discussion section.

Twenty clerks worked 5,102 man-days during this 4-year study. Their work schedules and interview sites were developed by random selection for each seasonal period. A sample one-week schedule in the 17-week fall period for the Taylors Landing site, 1983, is shown in Appendix P.

Field data was transferred from a field survey form (Appendix Q) to magnetic media and the information extrapolated to provide estimates on 40 different types of recreational activities. The basic equation for extrapolating the data was:

$$\text{Estimated visits or hours of recreational use} = \left(\frac{1}{\text{sampling probability}} \right) \cdot \left(\text{use measured in visits or hours} \right)$$

The sampling probability was the product of the station probability (Appendices A through N), the time of day probability (Appendix O), and the day probability (weekdays, 0.111; weekend days or holidays, 0.222). An example of extrapolation for a one-week period is as follows: During the week September 25 to October 1, 1983, station 6 (Taylors Landing) was sampled three times: at time period C (1600-2359) on Sunday, and at time period B (0800-1600) on Monday and Friday. The numbers of anglers interviewed by the clerk during the three sample periods in that week were 0, 3, and 6, respectively. The station probability of a Department access site is 1.0.

The three estimates of fishing (visits only) for the 1-week period were made as follows:

$$(1) \quad \frac{1}{(1)(0.37)(0.222)} \times 0 = 0$$

$$(2) \quad \frac{1}{(1)(0.60)(0.111)} \times 3 = 45.045$$

$$(3) \quad \frac{1}{(1)(0.60)(0.111)} \times 6 = 90.090$$

The single estimate for the 1-week period was:

$$\frac{0 + 45.045 + 90.090}{3} = 45 \text{ angler visits}$$

The total weekly estimates were combined to obtain estimates for the seasonal period.

Confidence intervals for each recreational use were computed by adding (upper limit) or subtracting (lower limit) the standard deviation of the estimated visits or hours from the estimated number of visits or hours. Therefore, on the average, 67% of such intervals would include the true number of visits or hours of use if sampling were done an unlimited number of times.

It is generally accepted that the 67% confidence intervals are used in recreational use surveys.

The summaries of types and numbers of permits possessed, distance traveled to the site, distance traveled on the river from the site, and age and sex of recreationists were obtained from empirical data.

Cooperators provided actual use figures of some recreational activities on the Missouri River. These were added to the estimates of use for those respective segments.

The travel cost method, used to determine estimated consumer's surplus, required two basic steps: 1) estimate a demand curve for the use of the area in question (B segment of Missouri River); and 2) determine the area's net economic benefit from the estimated demand curve (Missouri Department of Conservation 1988). The demand curve for a recreational area is no different from the demand function for other consumer products. The quantity of a good consumed is a function of the price of the good, the tastes and preferences of the consumer (recreationist), and the prices of substitute goods (conversation with Edd Brown, Missouri Department of Conservation). The demand function for recreational use on the Missouri River as used by Jeff Karrenbrock and Edd Brown was described by Rosenthol, Donnelly, Schiffhauer, and Brink (1986). Another excellent, detailed description of the travel cost model is by Dwyer, Kelly, and Bowes (1977).

Annual consumer's surplus, or net economic value, is total consumer's surplus less the cost of purchasing the good. It is the dollar amount above actual price the consumer (recreationist) would have been willing to pay for the good (also called the "willingness to pay"). For a much more detailed analysis of the travel cost methodology see Missouri Department of Conservation (1988).

Total consumer's surplus for the B segment of the Missouri River was determined by multiplying consumer's surplus per visit by total visits within 150 miles of the site as estimated by this recreational use survey. The estimated demand functions for several identified user activity groups are shown in Table 66 of this report.

RESULTS

Estimates of recreational use during this 4-year study were based upon data obtained from 61,890 personal interviews conducted at selected stations by trained clerks. Because of the length of stream surveyed each year, the segments were divided into sections to improve accuracy of the estimates. The A, B, and D segments were each divided into two sections, and the C segment was divided into three sections. The number of stations within each section varied (Appendices A-N). Recreational use at Missouri Department of Conservation sites is reported separately to provide needed information for administrative decisions regarding various departmental programs. The segments are presented in the order in which they were surveyed; B, C, D, and A.

B SEGMENT OF MISSOURI RIVER

Recreational Use

Use clerks interviewed 11,973 recreationists on the B segment (river miles 144-260) from August 28, 1983 to August 25, 1984. The estimate of total recreational use was 109,590 visitors and more than 630,000 hours (Table 1). The 37 identified recreational activities were analyzed seasonally by the number of visits and the hours engaged in each activity (Table 2).

We found that recreational use varied greatly by season. About two-thirds of both the recreational visits and hours of recreation occurred during

the spring and summer period (Table 2). Trotline fishing for sport, angling, and hoopnetting were the three most popular activities during the spring and summer period and combined made up nearly 65% of all hours expended. These three activities accounted for more than one-third of the visits and 56% of the hours expended during the year. Camping at both Department and other miscellaneous sites amounted to 25,280 hours, only 7% of the use during the prime use period in the spring and summer. People camped on Department sites throughout the year. A large concentration of campers (1,190 visits) was observed during January and February 1984 at the Lewis Mill Department access site on Little Chariton River (Fig. 2, station 4 upper section, Appendix C).

Two additional activities, for which the total visits and hours were based on actual counts rather than extrapolated estimates, were included in the total seasonal summary. These two activities were camping at Stump Island (Fig. 2, station 3 upper section, Appendix C) and a 3-day celebration also held at the same site. The most significant of these was the annual Tri-County Days celebration, where 5,200 visitors spent 13,000 hours. Records furnished by Glasgow, Missouri, Chief of Police William Cowell, indicated 870 campers spent 10,440 hours in the only developed campground on this 116-mile segment. Data for those two activities were obtained by total count because 1) the Tri-County Days affair, if included in the non-uniform survey, would have badly skewed that week's data, and 2) the campground figures could not be included in the regular survey because of the great distance of the camping area from the ramp where the clerk was regularly stationed.

Seven of the 39 recreational uses, including the two based on total counts, accounted for 53% of all visits and 77% of all hours (Table 1). Trotline fishing for sport was the number one activity and accounted for 29% of all hours spent and 7% of all visits. Angling (pole-and-line fishing) was

second, with 18% of all hours spent and about 23% of the total visits. Hoopnetting was the third most important activity and accounted for 9% of all hours spent and 2% of all visits made. The four other principal activities were commercial trotlining (1,780 visits), camping at Department sites, camping at other sites, and loafing. The category "camping at other sites" includes all camping except that on Department sites (i.e. that designated "Camping, Dept. sites") in the tables. Twenty-five of the 39 activities each constituted less than 1% of the total hours of recreation.

The harvest forms of recreation--fishing, hunting, trapping and gathering products (including berries, nuts, mushrooms and bait of several varieties)--collectively made up approximately 44% of all visits and 69% of all hours expended (Table 1). Fishermen harvested fish by angling, sport trotline, commercial trotline, hoop net, trammel net, and other methods, including some jugging, bow fishing, and gigging in overflow waters. These fishermen (38,390) spent 400,000 hours and harvested an estimated 64,000 fish (Table 3). Four species--channel catfish (37.5%), freshwater drum (14.3%), carp (10.2%), and flathead catfish (11.8%)--constituted 74% of the fish harvested.

Most fish were caught by pole-and-line anglers, and their catch rate (0.31 per hour) was good. The lowest catch rates were for trotlining: 0.07 per hour for sport, and 0.08 per hour for commercial. Catch rates for trotlining are usually lower than for other methods because of the relatively longer length of time the gear is fished (an average of 23 hours) before it is checked. Hoop nets, which are also fished for long periods of time, were much more efficient, with an overall catch rate of 0.22 per hour or about one fish every 5 hours. Not unexpectedly, trammel nets produced the greatest catch rates, 0.75 fish per hour. The most effective trammel netting was done in late fall and early spring.

Considerable effort was also expended by hunters in the narrow land corridor along this segment of river (Table 4). Dove, squirrel, and rabbit hunting was relatively good, with harvest rates of 66, 60, and 48 per 100 hours, respectively. These harvest rates were higher than those reported for the Gasconade, Big, Bourbeuse, and Meramec rivers (Fleener 1982, 1988).

For logistical purposes, this 116-mile study segment was divided into an upper and lower section and use determined independently. Both sections received considerable use but total use was heaviest on the lower section (Tables 5 and 6). Trotlining for sport was the principal activity on the lower section, and constituted about 36% of the total recreational hours. Angling was the principal activity at the upper section. Waterfowl hunting was very important in the upper section, and most of the 4,600 visits recorded were in the vicinity of the Dalton Cutoff and on or near Palmer Creek (Fig. 2, station 7 upper section). Only 10 waterfowl hunting trips were made on the lower section.

Six Department access sites were surveyed independently in this segment, five on the lower section and one on the upper section (Tables 7, 8, 9, 10, 11, 12). Recreational use on these areas was high. The combined use at the five Department areas on the lower section was more than 34,600 visits and 192,000 hours. This was about 99% of the combined visits and hours of use at the other six stations on the lower section (Table 5). The types of use at the Department sites were similar to those at the other stations. However, on-site camping was a primary use at Department sites, especially at the Marion access (Table 7).

Use at the Department site on the upper section was also high. The visits (7,820) and hours (32,240) were 29% and 16%, respectively, of the totals of the other eight stations surveyed on this section (Table 6). The

annual total of 7,820 visits at the Brunswick site was slightly higher than the average annual visits (6,930) for the five Department sites on the lower section. This site is in the city limits of Brunswick, located on Grand River about 2 miles from the Missouri River. It is heavily used by local residents as access to the Missouri River for fishing and boating.

User Characteristics

The distance traveled on the Missouri River by recreationists was determined during this survey. We found that nearly 92% of all visitors stayed in the vicinity of the access point, traveling not more than a mile from it (Table 13). At the Providence access site, the use pattern was different than in any other case. A lower number, about 76%, stayed within a mile of the access, and nearly 16% traveled from 1 to 5 miles of the ramp, which is about 1 mile from the Missouri River on Perche Creek. The number of recreationists traveling 1 to 5 miles by boat from the other Department sites was less than at the Providence access, and ranged from 0.9% at Franklin Island to 8.9% at Taylor's Landing. The distance traveled from non-Department sites was low in comparison with that from Department sites.

The distance traveled by recreationists to reach an access on the B segment shows heavy use by people living in close proximity to the area (Table 14). About 83% of all recreationists traveled less than 25 miles, and more than 32% lived 5 miles or less from one of our survey stations.

There was a 3:1 ratio between the numbers of male and female recreationists but little difference in age composition between the sexes (Table 15). The only noticeable differences were greater numbers of females than males in the under-12 and the 18-24 age categories.

Recreationists were asked whether they possessed some type of permit issued by the Missouri Department of Conservation. Over 52% had some type of permit (Table 16). The most common were the sport fishing permit (17%) and the combination fishing and hunting permit (12.6%). As indicated by permits, many commercial fishermen used the access sites. The highest percentages for this group were noted at Franklin Island (6.6%), De Bourgmont (6.0%), and at the miscellaneous sites on the upper section (6.4%). About 12% of those interviewed who were fishing or hunting had a free permit. Those were people 65 years or older.

C SEGMENT OF MISSOURI RIVER

Recreational Use

Use clerks interviewed 14,463 recreationists on the C segment (river miles 260-423) from August 26, 1984 to August 24, 1985. The estimate of total recreational use was 125,510 visitors and more than 626,000 hours (Table 17). The 34 identified recreational activities were analyzed seasonally by the number of visits and the hours engaged in each activity (Table 18).

Recreational use varied greatly by season (Table 18). Use was greatest during the spring-summer period and lowest during winter. More than one-half of the winter hours were spent by trappers and those enjoying passive leisure. About 60% of the recreational visits and hours occurred in the spring-summer period. Angling, trotline fishing for sport, and boating were the most popular activities, and combined accounted for 69% of all hours during the spring-summer period and 63% of the total hours during the entire year. Camping, both at Department of Conservation sites and other sites, was also an important activity during the spring and summer. Picnicking, passive leisure,

and sightseeing were other important summer activities, and combined accounted for 35% of the visits and 11% of the hours.

Five of the 34 recreational uses accounted for 57% of all visits and 75% of all hours (Table 17). Angling (pole-and-line fishing) was the number-one activity and accounted for 31% of all hours spent and 32% of all visits. Trotline fishing for sport was second, with 23% of all hours expended and about 5% of all visits. Boating was the third most important activity, and accounted for 8% of all hours and also 8% of all visits made. The two other principal activities were hoopnetting (44,920 hours) and picnicking at other sites (33,140 hours). Twenty-one of the 34 activities each constituted less than 1% of the total hours of recreation.

We found a great variation in average length of visit, depending upon the type of activity, but the grand average length of visit (5.0 hours) was similar to that found in B segment (river miles 144-260). This rather high average trip length was the result of visits by campers (17.6 hours), sport trotliners (21.3 hours), and hoopnetters (23.0 hours).

About 45% of the recreationists engaged in some form of harvest (i.e. consumptive forms of recreation). Activities in this category included hunting, trapping, fishing, frogging, collecting bait, and gathering products.

An estimated 126,958 fish were caught on the C segment in 397,020 hours of fishing (Table 19). The harvest was dominated by channel catfish, flathead catfish, carp, freshwater drum, and crappie (79%). Pole-and-line fishermen accounted for almost one-half of all fishing hours and they caught 70% of all the fish. Commercial fishermen using trotlines, hoop nets, and trammel nets made up about 6% of the anglers and caught about 11% of the fish.

Anglers (pole-and-line fishermen) caught about 86,400 fish at the average rate of 0.44 fish per hour. Five species--channel catfish, flathead catfish,

carp, freshwater drum, and crappie--made up 69% of the catch by anglers. Over 700 largemouth bass were harvested. We noted that 110 walleyes were taken by anglers. The lowest catch rates were for trotlining: 0.10 per hour for sport and 0.08 per hour for commercial. Catch rates were always lowest for trotline because of the relatively longer length of time the gear was fished (21.3 and 22.3 average hours, respectively, for sport and commercial trotlining). Hoop nets and trammel nets were effective commercial gear, catching fish at rates of 0.40 and 1.64 per hour, respectively.

Considerable effort was expended by hunters in the narrow land corridor along this 163-mile segment (Table 20). We estimated that hunters made nearly 6,000 visits during the 1-year study period. Waterfowl hunters made the most trips (2,400) and harvested waterfowl, mostly ducks, at the rate of 33 per 100 hours. Although the southern end of the Swan Lake goose management zone borders part of the river, goose hunting was poor on the river. Quail hunters had the highest success rates, harvesting a quail every 2 1/2 hours. Rabbit hunting was also good, with success rates (37 per 100 hours) quite similar to those on B segment (48 per 100 hours). The harvest rate of doves was less than half that on B segment. Only 248 Canada geese were harvested at a rate of 1 per 100 hours of hunting effort.

For logistical purposes this 163-mile study segment was divided into three sections and use was determined independently for each (Tables 21, 22, 23). All three sections received moderately heavy use, but the number of visits was highest (46,960) on the upper section (Table 23). Sites designated "other" on the upper section included some of the most heavily used of any in the study area. The well-developed ramps and parks at Atchison and Leavenworth, Kansas (Fig. 4, sites 3 and 5) were heavily used, not only by Kansans but by Missourians, because they are the only public accesses to the

Missouri River in that area except for the Schimmel City access on the Platte River.

Complete estimates of recreational use were obtained at three Department of Conservation sites in segment C. About 20% of all visits were made to these three sites, and the average number of annual visits to a Department site (8,420) was about 25% greater than the average for the other 16 sites (6,300). Estimated use at the Miami access site was about 11,000 visitors and 54,420 hours (Table 24). Because of the close proximity of this site to Miami, about 30% of the visits and 25% of the hours were spent for passive leisure, i.e. loafing. The other principal activities were trotline fishing for sport, camping, and angling.

Recreational use at the Grand Pass Wildlife Area (Table 25) was extremely light, about 3,530 visits and 12,960 hours. The number of recreational uses was also low (18), and 12 uses were of a consumptive nature. These included several methods of harvesting fish, eight types of hunting, and gathering products, primarily mushrooms. This wildlife area had been recently purchased and was undeveloped during the time we conducted the survey.

Estimates of total recreational use at the Department's Schimmel City site on the Platte River (Table 26) were similar to those at the Miami site. The principal uses at this site were related primarily to fishing. Angling made up nearly 44%, and trotlining for sport accounted for nearly 15% of the total visits. Combined, these two forms of fishing accounted for 77% of the hours spent at this site. Floating was also popular (740 visits). Floaters were usually in organized groups from Leavenworth, Kansas, and completed their trips at this site.

User Characteristics

The evaluation of distance traveled on the river (Table 27) showed that over 91% of the visitors never traveled more than a mile from their put-in access site. However, over 18% of the boaters at the Miami access site traveled up to 10 miles in one direction on the river. No ramp facilities were available at the Grand Pass access, with the result that only 0.4% of the visitors left the area. The ramp at Schimmel City on the Platte River was used extensively to reach the Missouri River, and 8% of the recreationists using this access traveled from 1 to over 50 miles on the Missouri River. The Schimmel City ramp was also used as a take-out point by many boaters and several organized canoeing groups that started floats at the Leavenworth, Kansas, site (Fig. 4, station 3).

This section of the river was heavily used by people living in close proximity to the area (Table 28). About 84% of all recreationists interviewed traveled less than 25 miles and nearly 44% lived 5 miles or less from the site where they were interviewed.

About 75% of the recreationists were males (Table 29). The age distribution of the sexes was similar, except for a greater proportion of females in the under-12 age category.

Of 13,423 recreationists interviewed, about 54% had some type of permit issued by the Department of Conservation (Table 30). The most common were the sport fishing permit (27.5%) and the combination hunting and fishing permit (10.6%). Only 1.3% had a resident hunting permit. About 250 visitors had the resident commercial permit, an indication of the heavy commercial fishing activity (about 9,670 visits, Table 17) in this 163-mile stretch. The highest percentage of commercial fishermen used the Miami access site (4.3%) as

compared with the average percentage of 1.8% for all interview sites combined. About 12% of the total recreationists interviewed had a free permit.

D SEGMENT OF MISSOURI RIVER

Recreational Use

The use clerks interviewed 11,683 recreationists on the D segment (river miles 423-553) from August 25, 1985, to August 23, 1986. The estimate of total use on this 130-mile segment was 236,930 visits and 1,123,750 hours (Table 31). Included in the estimate were empirical figures for a number of recreational uses. These activities included sightseeing, picnicking, camping, and horseback riding at Indian Cave State Park, Nebraska (Fig. 5, No. 4 site in the upper section); attendance at the Museum of Missouri River History (this is located in the river dredge Meriwether Lewis at Brownville, Nebraska); visits on the excursion boat "Belle of Brownville"; and results from seven fishing tournaments, either for carp or catfish. The most significant of all these activities were sightseeing and picnicking (133,530 visits and 267,000 hours) and camping (12,130 visits and 582,240 hours) at Indian Cave State Park. Surprisingly heavy recreational use was recorded by the excursion boat, 7,500 visits in the 1-year period.

Recreational use was found to vary greatly by season (Table 32). Nearly three-fourths of all use occurred in the spring-summer period and only about 3% of the total hours were expended in the winter period. Sightseeing throughout the length of D segment (130 miles), pole-and-line angling, and visits to the Missouri Museum of River History were the most popular activities in the spring and summer period; combined they made up 81% of the visits and 31% of the hours expended. Camping at Indian Cave State Park, at other sites, and at Department sites amounted to 9,990 visits and 460,290

hours, 6% and 56% of the visits and hours, respectively. By far the greatest amount of summer camping occurred at Indian Cave State Park.

Two of the 37 identified recreational uses, and two uses based on total counts, accounted for 69% of the total annual visits and 85% of all hours (Table 31). Camping at Indian Cave State Park was the number one activity, followed by sightseeing/picnicking at that area. Angling (pole-and-line fishing) was third, with participation during 6% of all hours and about 7% of total visits. In terms of hours (34,340), trotline fishing for sport was the fourth most important activity, although in terms of visits sightseeing actually ranked second with over 27,000 visits. Twenty-seven of the 39 activities each constituted less than 1% of the total hours of recreation.

The average length of visit varied a great deal, depending upon activity type. Despite the heavy weight contributed by length of camping visit (44.0 average hours for use at Indian Cave State Park, Department sites, and non-Department sites combined) the average length of visit was about the same as in the other study segments. High passive leisure and sightseeing use were largely responsible for the grand average figure of 4.7 hours duration for the 236,936 visits.

About 9.6% of the recreationists participated in some form of consumptive use. This use took place during 22,400 visits (about 172 visits per mile). The principal consumptive uses were the various categories of fishing.

Success by fishermen was good. All categories of fishermen harvested an estimated 48,852 fish in 134,990 hours (Table 33). About 28% of the fish were harvested by pole-and-line anglers. Flathead catfish, carp, channel catfish, and freshwater drum were the four most frequently caught species. The lowest catch rate was by sport trotlining (0.08 fish per hour). The commercial trotlines were noticeably more successful, with the catch rate of 0.30 fish

per hour. Hoopnetting was highly efficient; nearly 26,000 fish were harvested at the rate of 0.98 fish per hour. About 11,000 channel catfish and nearly 10,000 carp were taken by hoop nets. The catch by trammel nets was 2.16 fish per hour, and more than 4,800 fish, of which one-half were carp taken primarily in the fall and spring periods.

We noted that about 1,190 visits were made by hunters on this 130-mile segment (Table 31). Deer hunters, both gun and bow, made the most visits (590) and harvested 38 deer (Table 34). An estimated 160 waterfowl hunters harvested only 38 waterfowl, including 20 snow geese, at the rate of six per 100 hours. Squirrel hunters had the best success rate of any of the 11 categories of hunters surveyed, harvesting 46 squirrel per 100 hours.

This 130-mile segment was divided into an upper and lower section, each 65 miles in length. Recreational use was determined independently for each section (Tables 35, 36). The upper section had four access sites, compared to only two on the lower section. There was considerable variation in the amount of use between the two sections. The number of visits was greatest on the upper section (Table 36), over twice that on the lower section (Table 35). However, the use expressed in hours was similar in both sections. Recreational use, expressed as visits, was very nearly the same on a per-site basis for lower and upper sections, 4,035 and 4,765, respectively. Fishing, particularly pole-and-line angling, was very popular at miscellaneous sites on the upper section. There was extensive commercial fishing activity, principally hoopnetting and trotlining, at the miscellaneous sites. Much of the use was by non-residents.

Six Department sites were surveyed in the segment. Three of these sites--Worthwine Island, Nodaway Island, and Paynes Landing (Tables 37, 38, 39)--were in the lower section. The combined use of these three sites was

about 70% of the visits and 60% of the hours of use at all sites (two non-Department, three Department) in the lower section. Average recreational activity was higher at Department sites than the average use at non-Department sites. Average use was 6,380 visits and 22,710 hours at Department sites, and 4,025 visits and 21,940 hours at non-Department sites.

Recreational use patterns varied widely among the three Department sites in the lower section. Angling (hook-and-line fishing) made up 26% and 24% of the total visits at the Paynes Landing and Nodaway Island accesses, respectively. At the Worthwine Island site this use amounted to only 14%. The greatest amount of upland game hunting occurred at the Worthwine Island site. This included quail, dove, and pheasant hunting, with a total of 170 visits for these activities. This access and the surrounding Department-owned land between the levee and the river have extensive habitat for these species.

Combined recreational use intensity at the three Department sites on the upper section was similar to that at the three Department sites on the lower section, 20,500 and 19,130 visits, respectively. The sites on the upper section were Thurnau Wildlife Area, Langdon Bend, and Watson (Tables 40, 41, 42). The last-named access lies on the Nishnabotna River.

Combined use of these three sites was about 52% of the visits and 59% of the hours of use at all (4) non-Department sites in the upper section. Average recreational use in visits and hours was much greater at these three Department areas (6,830 and 23,710) compared to 4,760 and 12,270, respectively, for the miscellaneous sites.

The primary use of the Watson access was pole-and-line fishing; 48% of all visits in the 1-year survey period involved this activity. Both the Watson and Langdon Bend accesses were heavily used by commercial trotliners (a combined total of 560 visits). We determined that most of the commercial use was by Nebraska and

Iowa residents. Heavy camping activity was noted at Thurnau Wildlife Area (410 visits).

User Characteristics

Table 43 summarizes the percentages of visitors to D segment who traveled various distances on the river. About 84% of the recreationists on D segment, and also on the upper section of D segment, traveled less than a mile on the river. More than one-third of the boat users at Nodaway Island and Godfrey Payne access sites traveled over a mile, one way, on the river. This is probably because the ramps at these two sites are some of the best-developed for launching, and because these sites are close to the largest city (St. Joseph, Missouri) in the 130-mile segment. Also, the use demand on these sites is increased because there is no ramp at the Worthwine Island site. The greatest number of non-resident commercial fishermen on the D segment used the Langdon Bend and Watson Department sites. From 7% to 20% of the river trips ranged from 1 to 10 miles at these two sites, respectively.

The distance traveled by recreationists to an access on the D segment indicates that over 81% of those visitors lived within 24 miles of the river, and over 22% of them drove 5 miles or less (Table 44). Two Department accesses, Worthwine Island and Nodaway, had the greatest number of users coming from 24 miles distant or less, 92% and 91%, respectively. Those two sites have the closest proximity to St. Joseph, Missouri.

One of the most consistent characteristics of the recreationists was the ratio of males to females. It was 3:1 in the D-segment user population (Table 45), which incidentally was the same as on the other segments. There were no outstanding differences in the ratios of male to female visitors in our eight standardized age categories.

The determination of permit composition for recreationists on the D segment (Table 46) showed that about 35% of those interviewed had one or more permits issued by the Missouri Department of Conservation. This figure even includes individuals who were interviewed at a Nebraska or Kansas site. We found that a greater number of persons from those states contiguous to the Missouri River had purchased some type of Missouri license. The percentage of these individuals was greater at Department accesses than at the six miscellaneous sites on the lower and upper sections, the only exception being the Nodaway Island site. At the Godfrey Payne and Thurnau Wildlife Areas, half of the recreationists had some kind of permit. Visitors to those two sites had the highest percentage of hunting permits (7% of the total interviewed). At the Worthwine Island and Langdon Bend accesses, the highest percentages of combination permits were noted, nearly 18% and 14%, respectively.

A SEGMENT OF MISSOURI RIVER

Recreational Use

Use clerks interviewed 23,771 recreationists on this segment from August 24, 1986, to August 22, 1987. The estimate of recreational use was 139,970 visits and 656,340 hours (Table 47). Thirty-eight recreational activities were monitored seasonally in terms of visits and hours (Table 48). About 64% of all visits and hours occurred in the spring-summer period. Very little use (8% of the visits and 5% of the hours) occurred in the winter period. Angling, boating and sightseeing were the most popular activities in the spring and summer-period, making up over 54% of all visits. These uses, along with passive leisure, also dominated in the fall period, constituting 47% of all visits.

Seven of the 38 activities accounted for 78% of all visits and 77% of all hours during the 1-year survey (Table 47). Pole-and-line fishing, trotlining for sport, and hoopnetting, the three principal consumptive uses in the A segment, were the most dominant recreational uses in the survey, and amounted to 30% and 61% of the total visits and hours, respectively, on A segment. The other four principal activities on A segment were boating, sightseeing, passive leisure, and picnicking at miscellaneous sites. Twenty-three of the 38 activities each constituted less than 1% of the total hours expended by recreationists.

The average lengths of recreational visits varied widely, ranging from 0.6 hours for sightseeing to 23.8 hours for sport trotline fishing. The average length of a visit for all activities was 4.7 hours.

Harvest forms of recreation--including not only the three principal activities just referred to, but also commercial trotlining, trammel netting, miscellaneous other methods for harvesting fish, hunting, trapping, gathering products, frogging, and collecting bait--together constituted 36% of all visits and 69% of all hours (Table 47). Fishermen used an array of gear to harvest 136,500 fish. The 44,160 fishermen fished 428,510 hours and had an overall catch rate of 0.32 fish per hour (Table 49). Four species completely dominated the harvest, accounting for 72% of the total. They were channel catfish (23%), carp (21%), buffalo (14%), and freshwater drum (14%).

The greatest number of fish were caught by hoop nets and their catch rate, 0.69 per hour, was good. Pole-and-line angling accounted for 24% of the total harvest at the rate of 0.34 fish per hour. Trammel nets, although used very little, produced the highest catch rates, 2.17 fish per hour. This type of gear is the most efficient of any used on the Missouri River.

About 3,730 hunting trips were taken on the narrow land corridor associated with the A segment. Ten types of hunting were surveyed. Both dove and squirrel hunting were relatively good, with harvest rates of 45 and 41 per 100 hours, respectively (Table 50). Waterfowl hunters had an overall harvest rate of 11 per 100 hours. Their total harvest of 500 birds was dominated by mallards, an estimated 243. Catch rates for trapping were relatively high, considering that trappers have a high average trip length (21.8 hours). Raccoon (506), mink (78), beaver (154), and opossum (1,205) were important components of their catch.

Recreational use at all stations, except Department accesses, was higher on the lower section (Table 51) than on the upper section (Table 52). The heavy use on the lower section was due primarily to sightseeing and pole-and-line fishing. There were also more types of use on the lower section (32) than on the upper section (23).

Eight Department access sites were surveyed in this segment. Two were in the lower section; these were Howell Island (Table 53) and Weldon Spring (Table 54). The combined use at these two sites was about 45% of the visits and 43% of the hours of use at all sites (three non-Department, two Department) on the lower section. There was slightly higher average use at the Department sites than at the non-Department sites. Average use in visits and hours was 13,680 and 41,490, respectively, at Department sites, and 11,290 visits and 36,090 hours at non-Department sites. There were no distinct differences in the use patterns at these two sites, which are close to each other but on opposite sides of the river (Fig. 6). The same types of fishing and nearly the same number of visits, 5,140 and 5,750, occurred at Howell Island and Weldon Spring, respectively. Each of these accesses was used seasonally by hunters from St. Charles and St. Louis counties.

Six Department access sites were surveyed in the upper section of A segment. Combined use at the six sites was 45,000 visits and nearly 285,000 hours (Tables 55, 56, 57, 58, 59, 60). Use at these sites was about 60% of the visits and 65% of the hours at all sites (9) in the upper section. Use at the Gasconade Park site (Table 56) was greater than at any of the other 22 Department sites surveyed during the four years of the project. Nearly 16,000 recreationists used the Gasconade Park access during the 1986-1987 survey period.

Trotline fishing for sport ranked either first or second at each of the six Department sites, ranging from 22% to 64% of the total hours. A total of 3,800 visits and 90,600 hours were expended by sport trotliners at the six Department sites. Angling (pole-and-line) and boating also were important uses at all sites. Camping on five Department sites was significant, with a combined total of 700 visits. No camping was noted at the Mokane access. Other important family-oriented recreational activities included sightseeing and passive leisure; total visits to Department sites for these two activities were 4,570 and 3,580, respectively.

User Characteristics

About 80% of the visitors to A Segment traveled a mile or less on the river from the access site where they were interviewed (Table 61). At the miscellaneous sites on the upper section, only 60% traveled a mile or less, and nearly 15% traveled 10 miles or more in one direction from the access site. At one Department site, Colter's Landing, 40% traveled a mile or more on the water. On the other hand, all of the other Department sites (7) had a clientele that for the most part stayed at or near the access site. The percentages of these short-distance travelers ranged from 78% at Weldon Spring to about 95% at Howell Island, Bonnots Mill and the Moreau 50 access.

We found that about one-third of the recreationists on A segment traveled 5 miles or less, and over 81% traveled less than 25 miles (Table 62), to reach the area. The majority of visitors to Howell Island and Weldon Spring (about 70% in each instance) traveled less than 25 miles, indicating heavy local use, primarily from highly urbanized St. Charles and St. Louis counties. About 0.5% of the visitors traveled 500 miles or more to this river segment.

Nearly three-fourths of the recreationists were males (Table 63). Two differences in age and sex distribution were noted. A much higher ratio of males to females was found in each age category, and in the 11-week winter period.

Over half (52%) of the 19,993 recreationists interviewed had some type of Missouri Department of Conservation permit (Table 64). More combination licenses (23%) were held than fishing permits (15%). Percentages of recreationists having some kind of permit were higher at all eight Department sites (ranging from 47% to 82% of all those interviewed) than at miscellaneous sites on the lower and upper sections (28% and 29%, respectively). Ten percent of those interviewed had a free permit.

ESTIMATED ANNUAL RECREATIONAL USE AND NET CONSUMER'S SURPLUS ON THE ENTIRE STUDY AREA

Although our study of 553 miles of the Missouri River was conducted in four 1-year segments, we wanted to know whether total use changed over the 4-year period. In order to make this determination, we surveyed use at two Department sites throughout the study and extrapolated the average use of the two sites to estimate total use. Our assumption was that any change in the average annual use at the control sites would be representative of change at all sites, and therefore could be used to estimate total annual use for the 553-mile study area. An estimate of total annual use was first done in this

way for the 264-mile Gasconade River (Fleener 1982) and then for the 489-mile study area of the Meramec River (1988).

We selected two Department-owned areas for control sites: Providence (Fig. 2, No. 5 on lower section of B segment) and Gasconade Park (Fig. 6, No. 4 on upper section of A segment). These sites were selected because their recreational uses were diverse and representative of those at all stations subsequently sampled throughout the census area. Based on the average of the use of these two sites, we estimated that total use on the 553-mile area was about 490,600 visits and nearly 2,500,000 hours during the first year of our survey (Table 65). An increase in recreational use in both visits (72%) and hours (71%) occurred during the second year. During the third year, a decrease in recreational use in both visits (-23%) and hours (-21%) occurred. In the final season (year four), visits decreased 17%, and hours 28%. Recreational use in visits increased slightly (9%) over the 4-year period, but total hours expended decreased 2%.

Net consumer's surplus (C.S.) values were computed for the B segment (river miles 144-260). The annual net consumer's surplus for this segment was \$406,160 (Table 66). The calculations were done using a simplified travel cost model and were based on an estimated 98,344 total visits (Missouri Department of Conservation 1988). My figure for total visits in the B segment was 103,520, and this included the camping and Tri-County Day celebration at Stump Island access (Table 1). This shows the carefully considered, conservative approach in the 1988 MDC study, in which they used about 5,000 fewer visits in their estimation of net consumer's surplus. Extrapolation of the \$406,160 C.S. value for the 116-mile B segment yielded an estimate of \$1,936,000 for annual net consumer's surplus on the 553-mile study area.

DISCUSSION

This survey provides the first quantitative information about recreational use on the Missouri River. The Department of Conservation needed information on all types of recreational use associated with the river and adjacent corridor to assess the impacts of several proposed projects. The project that prompted the survey was a plan by South Dakota to sell Missouri River water to Wyoming for a slurry coal pipeline. This information was also needed for baseline data that could be used to make wise resource management decisions.

Numerous survey techniques have been developed to estimate use of various recreational activities on rivers. A good summary of methodologies is given by Marnell (1977). However, the statistical precision of most methods from Marnell's paper is not good, and standard errors are generally high even at the 67% level of probability. James and Harper (1965) used a stratified random sampling plan modified from Cushwa and McGinnes (1963) to measure recreational use in Ocala National Forest in Florida. Their attempt to solve one of the inherent problems associated with this type of survey sampling (variation in visitor exit use at large numbers of sample sites) was very good, the standard error of their estimates being $\pm 22\%$. They were studying a large area and dealt with a relatively large number of accesses.

I used a non-uniform probability design in this survey, because I could estimate all recreational uses associated with the river and a narrow adjacent land corridor, and change station probabilities according to seasonal uses. This methodology has been used successfully on other rivers in Missouri (Fleener 1971a, 1976, 1977, 1982, 1988). My estimates of recreational use by the non-uniform design have been precise, as indicated by relatively small standard errors (Table 67). The standard errors in this survey were the best

ever for total visits, lying within the range of +3 to +5% for the four study segments. This is the result of experience in assigning the probabilities to the sites (Appendices A-N).

During the 4-year study we spent 5,102 man-days surveying recreationists at access sites. Data was obtained from 61,890 personal interviews in the four segments. In addition, 7,857 visitors were interviewed at the two control sites, which will be referred to later in this discussion. The total number of visitors interviewed thus was 69,747, an average of about 14 per survey-day during the 4-year period. More effort is required to conduct non-uniform surveys, but the sample reliability is much greater than from the traditional creel surveys.

This survey showed that the Missouri River is an important and generally heavily used recreation area. Total recreational use (land and water) was greatest on the D segment (river miles 423-553), with 16 visits and 77 hours of use per acre. This use was comparable to visits per acre on the Osage Fork of the Gasconade River, and to hours per acre on the Bourbeuse River and on Pool 21 of the Mississippi River (Table 67). Overall recreational use was lower on the other three downstream segments, ranging from five to six visits per acre, and from 24 to 35 hours per acre. Recreational use on A segment (river miles 0-144) was exactly the same as for the lower segment of Grand River, five visits and 24 hours per acre.

Fishing, which included fishing by pole-and-line and a variety of other sport and commercial methods, was the most popular activity (in terms of both visits and hours) on all except the D segment. Fishing was the activity pursued during 31% to 40% of the visits and 63% to 65% of the hours. Although angling visits to D segment (two per acre) were comparable to those on the other three segments (2 to 3 per acre), the heavy use concentrated at Indian

Cave State Park, Nebraska, influenced the position of fishing in relation to other activities. Popular recreational activities at the park included sightseeing, picnicking and camping, with a total of 145,660 visits in the 1-year study period. Although fishing was not the most important activity in D segment, it was a popular recreation activity, with more than 19,220 estimated visits.

Fishing pressure was highest in the B segment (river miles 144-260), at 27 hours per acre, and ranged from 12 to 22 on the other three segments. Fishing pressure on the Missouri River is similar to that on Pool 21, Mississippi River, and on the lower Current River (12 hours per acre). Hanson (1975), using a non-uniform sampling technique, reported fishing pressure of 19 hours per acre on Thomas Hill Reservoir.

The Missouri River supports a diverse fish population, estimated presently at 65 species, and characterized by a distinct group of fishes that Pflieger (1971) designated the Big River faunal group. Catch rates for all angling methods (pole-and-line, trotline commercial, trotline sport, hoop net, trammel net) ranged from 0.16 fish per hour on B segment to 0.36 fish per hour on D segment. The high catch rate on D segment shows that fishing, although masked by heavy use at Indian Cave State Park, was very successful, indeed. More than 16,000 channel catfish and 8,000 flathead catfish were harvested in this 130-mile long segment.

By far the greatest amount of fishing on all stream segments was by angling (pole and line). Catch rates for angling ranged from 0.20 fish per hour on D segment to 0.44 per hour on the 163-mile C segment. By comparison, angling catch rates on four segments of the Meramec River, a renowned Ozark stream, ranged from 0.18 fish per hour on the 74-mile upper Meramec (including lower portions of both Huzzah and Courtois creeks), to 0.44 fish per hour on a

117-mile segment of lower Meramec (Fleener 1988). Two other streams included in that survey did not have high catch rates either; rates for the Big River and Bourbeuse River were 0.19 and 0.29 fish per hour, respectively.

Methods designated as commercial showed a wide range in effectiveness expressed as fish per hour. Trammel nets were the most effective gear, with catch rates ranging from 0.75 to 2.17 fish per hour. Trammel net use was limited in most instances to a short period in late fall and early spring, and thus less fish were harvested by this highly efficient gear.

The commercial gear of choice in most instances was the hoop net. It is highly efficient, with the second highest rates of capture (0.18 to 0.98 fish per hour). On A segment, a total of 87,000 fish--amounting to 64% of the total harvest--were caught at the rate of 0.69 fish per hour. The next largest catch by this gear was from D segment, where about 26,000 fish were caught at the rate of 0.98 per hour.

The least efficient commercial gear is the trotline. The survey monitored both commercial and sport trotlining; the latter is pursued as a hobby by large numbers of individuals who often purchase additional series of 50 hooks as allowed under commercial fishing regulations. Many of these individuals fish for fun and furnish fish for neighborhood gatherings and other occasions. Another segment of fishermen fish trotlines for the market. Catch rates by sport trotlining were lowest, and averaged from 0.07 to 0.11 fish per hour. The commercial trotline rates of catch per hour ranged from 0.08 on B segment to 0.30 on the D segment. The harvest by sport trotlining was nearly five times as high as the harvest by commercial trotlining over the four segments.

Two other harvest methods used on the Missouri River are jug fishing and spearing for carp in overflow waters. These methods are listed under the

category "other" in the harvest tables (Tables 3, 19, 33, 49). Jug fishing is done by only a few people, and is the best single method to harvest blue catfish. Census personnel saw large catches of this species from time to time in the lower 260 miles of the study area (segments A and B).

I would consider hunting in the narrow band of land adjacent to the stream to be relatively important. Hunters made up a higher percentage of the total visitors in B and C segments, 6.6% and 4.5% respectively. Numbers of hunters in a large variety of categories ranged from 1,190 on D segment to 7,220 on B segment. Moderately high hunting intensity on A segment (3,730 visits) was due primarily to the presence of the Weldon Spring and Howell Island Department sites, both within easy traveling distance of metropolitan St. Charles and St. Louis. Nearly one-fourth of the hunting visits to A segment were to these two Department sites. This is an indication of the recreational opportunities the Department sites provide city dwellers, who would otherwise have few places to go to enjoy the Missouri outdoors.

The narrow, timbered band of land along the river provides hunting opportunities throughout the 553-mile distance. The lowest hunting intensity (1,190 visits, or 9 visits per mile) occurred on D segment, and the highest on B segment (7,220 visits, or 62 per mile). Some of the factors influencing the amount of hunting are related to the human population in counties contiguous to the river. In the D segment, the populations from the four Missouri counties, three Nebraska counties, and one Kansas county in the 130-mile stretch totaled an estimated 161,000 people as of December 1984 (Commercial Atlas and Marketing Guide 1989). By contrast, counties bordering the 116-mile B segment had an estimated 281,000 people for the same time period. Population in the lower 144 miles (A segment) was estimated to be 1,368,700, and the 3,730 visits amounted to an average of 25 visits per mile.

Interestingly, squirrel hunters had about the same success rate (41 to 46 squirrels per 100 hours of effort) in the A and D segments, despite differing hunting intensities.

On both the two upper segments, C and D, the narrow land area was particularly desirable for deer hunting. Gun hunters harvested an estimated 72 deer, and bow hunters an additional 25, in the 163-mile C segment. The harvest from D segment was 38 deer. Actual harvest rates for deer hunting on all segments ranged from one to three deer per 100 hours.

Overall hunting intensity on the land adjacent to the Missouri River was higher than on the Meramec River, a stream system that in general has good hunting opportunities widely dispersed in the surrounding Ozark forest habitat. Hunting harvest more nearly paralleled that of Grand River, where the watershed is similar to the Missouri River's (primarily agricultural land), and where the narrow timbered river border provides good deer habitat and the field crops provide diversified upland game hunting opportunities (Fleener 1977). The Grand River hunting was characterized by a high deer harvest (360 deer; 4 deer per 100 hours) and a high dove and quail harvest (124 and 49 per 100 hours, respectively) from the lower 56-mile segment. Doves were an important component in the Missouri River area wildlife harvest, except on the D segment. Harvest rates for this species ranged from 28 to 66 per 100 hours on the A, B, and C segments.

Some waterfowl hunting occurred on all segments of the Missouri River, but the B and C segments had the greatest harvest rates, 30 and 33 per 100 hours, respectively. The lower Grand River harvest rate (1975 waterfowl season) was 15 per 100 hours. Included in the 1975 Grand River harvest were an estimated 18,950 Canada geese. The harvest rates in the Missouri River survey, conducted about a decade later, indicate the excellence of waterfowl hunting in select places in the middle 279-mile portion (B and C segments).

Both Department and non-Department sites throughout the 553-mile area provided camping opportunities. I determined that camping at the non-Department sites was a very important use in all segments, and the Department sites also played a part in camping activity. For example, many people camped on sand bars which they reached by boat after parking their vehicles at Department accesses. A typical instance of this indirect use was on D segment, where 360 camping visitors used non-Department sites, but were interviewed as they left one of the six Department sites. An estimated 580 camping visits were made at Department sites, and interestingly, 160 of this number were made by people who exited at one of the six non-Department sites. The greatest single concentration of campers on the entire 553-mile survey area occurred on D segment, at Indian Cave State Park, Nebraska. Records kept by park personnel in the sample year (August 25, 1985, to August 23, 1986) indicate camping visitation of 12,130. Indian Cave State Park was the only designated State Park next to the Missouri River in our survey. At present, Weston Bend State Park, Missouri, located between 4 and 5 miles above Leavenworth, Kansas, is under construction, and will ultimately provide a much-needed access with a ramp in that area. Some land-based recreational use was included from this site (Fig. 4, number 4) during this survey, but the site probability was extremely low, about one-fifth that of the Leavenworth, Kansas, site (Appendix J).

The only other camping site with other than a State Park or Department of Conservation designation was the Stump Island camping area at Glasgow (Fig. 2, Station 3 in upper section of B segment). The Glasgow Police Department kept records of use for that site and determined visitation of 870 in the 1-year period August 28, 1983, to August 25, 1984. Indian Cave State Park and Stump

Island are the only two sites in the survey with electrical hookups and an approved potable water supply.

This study revealed the importance of Department of Conservation access sites to recreationists on the Missouri River. Approximately 32% of the total visits and 29% of the total hours expended were at the 23 Department sites. These percentages were calculated including the high recreational use at Indian Cave State Park. Total annual use at these 23 sites ranged from 3,530 visits at Grand Pass Wildlife Area (Table 25) and 6,850 hours at Worthwine Island access (Table 37), to 15,930 visits and 109,190 hours at Gasconade Park access (Table 56). Average annual use at the 23 Department sites was 7,990 visits, an average of 21 persons per day, per site. Recreational visits for 41 non-Department sites (exclusive of sites where direct counts were used) amounted to 6,150 annually, or an average of 23% less than for the Department sites.

The average distance between sites for all 64 Department and non-Department sites is 8.6 miles. The average distance between Department sites is 24 miles. The 163-mile C segment (Fig. 3 and 4) has the fewest Department sites (3); they average 54 miles apart. The lower section of segment C (Fig. 3) has no adequate access on the north side (left bank) of the Missouri River. This 62-mile stretch could be much improved by an access site on the north side between Waverly and Missouri Highway 13. Average distances between Department accesses on the other three segments range between 18 miles on A segment to about 22 miles on D segment. Access on D segment is good, and will be helped by addition of the facility at Weston Bend State Park (Fig. 4, number 4). This Missouri park is currently under development. Accesses on the 116-mile B segment are adequate at the present time. There is need for further accesses on the north side (left bank) in the 144-mile A segment (Fig.

6). No access, Department or non-Department, is available between the Mokane access and Weldon Spring, a distance of 78 river miles. Recreational use would be enhanced by access in this area, since people in counties on the north bank of the river have to travel great distances to an access site. People in the north-facing tier of counties can cross the river only at Hermann or Washington to reach an access.

Since the survey was completed, a fine Department facility has been developed at New Haven (Fig. 6). On the occasions I have visited this site, I have noticed increasing use in the first year it has been open to the public.

Carrying capacities on all four segments are not high when compared to other streams we have surveyed. There is some kind of outdoor experience on the Missouri River for anyone who is seeking it, and in most cases those who want solitude can find it without much difficulty.

We chose two Department accesses as control sites to measure changes in use during the 4 years. These sites were Providence (Fig. 2, number 5 on lower section of B segment) and Gasconade Park (Fig. 6, No. 4 on upper section of A segment). Recreational use at those two sites, and over the entire 553-mile study area, was affected by annual environmental changes. Analysis of stream flow data collected at the Missouri River gage at Hermann (Fig. 6) was carried out to determine average stream volume (United States Department of the Interior 1984, 1985, 1986, 1987, 1988). The mean flow data (cfs) was determined for the heaviest use period (April through September) for each year of the survey. The average annual discharge over the 90-year period of record for this gage was 81,740 second-feet. Water conditions during the heavy use period in the first year (1984) were very unsuitable for river activities; the mean flow was 160,680 second-feet, indicating extremely high water conditions over a long period of time. Control site records indicated that no one used

the Providence access for 27 days or the Gasconade Park access for 12 days. During the second year, we experienced flows closer to normal, the 6-months mean-flow being 100,735 second-feet. In the heavy-use season, only 2 days were found to be unfit for recreational use at Providence access, and 3 days at the Gasconade Park access. Also in the second year, we had a 72% increase in recreational visits and a 71% increase in hours. In the third and fourth years, average mean flow in the 6-month period increased to 113,060 cfs and 121,790 cfs, respectively. Although there were few unsuitable days recorded from control sites in those two years (three at Providence in year 3, and none in either year 3 or year 4 at Gasconade Park), there were decreases in use during both years from the high recorded in year two. Apparently the average mean flow of about 100,000 second-feet in year two is ideal for most recreational activities in the busy season, April through September.

We calculated an overall net consumer's value of \$1,936,000 for the 553-mile stretch, based on the net consumer's value for the B segment. This is an indication of the economic value of recreational use on this stream.

The Missouri River survey was originally proposed, in part, because of concern over a number of plans to transfer water from the Missouri River (Missouri Basin States Association 1982). The transfer proposal of most concern just prior to initiation of this survey was one by South Dakota to sell water to ETSI, a five-company consortium. ETSI planned to build a water pipeline from South Dakota to Wyoming, where the water would be mixed with coal dust to form a slurry and then piped down to power plants in Oklahoma and Arkansas and to a barge depot in Louisiana. The amount of water required for the slurry pipeline, 57,000 acre-feet, is actually a drop in the bucket compared to the amount needed for another project, the High Plains proposal, which would require 2.3 to 4.3 million acre-feet annually. To get a

perspective on the amount of water the High Plains Plan would divert, consider that the 90-year discharge at Hermann, Missouri, is 59,221,000 acre-feet, annually.) The problem with the ETSI proposal--as stated by Phillip Rotert, Chief of Planning, Kansas City District Corps of Engineers, in a Columbia Missourian (Columbia, Missouri) article dated March 16, 1983--"is not the amount of water, but the precedent it may set."

Although plans to construct the 1,400-mile pipeline were scrapped in 1983, officials in Missouri, Iowa, and Nebraska presented arguments before the United States Supreme Court on November 3, 1987. On February 28, 1988, the Supreme Court ruled that the Department of Interior does not have the right to allow the sale of Missouri River water for industrial purposes. The 8-0 decision confirmed a 1986 verdict of the Eighth U.S. Circuit Court of Appeals (St. Louis), despite the arguments of North Dakota, South Dakota, and Wyoming that the circuit court ruling deprived them of the right to use waters within their boundaries for industrial purposes. Perhaps the clincher for the successful resolution of the case in favor of the states on the lower part of the river was the Missouri Attorney General's argument that the Flood Control Act of 1944 does not give the Secretary of Interior authority to market water from a Corps reservoir. In the case of the ETSI project, water would have been diverted from Oahe Reservoir in South Dakota.

The concerns of the downstream states were important in the positive outcome of this case. Information from this recreational use survey documented the variety, amount, and economic value of recreation in the 553-mile study area in Missouri. Missouri River recreational opportunities will undoubtedly increase in the future. The survey conducted by Bachant and Martindale (1982) indicated that the Missouri River in 1981 ranked sixth in

present worth, and first in future worth, of the 38 major watersheds in Missouri. Much of this increase in worth will result from the growing number of residents in counties contiguous to the Missouri River. In 1960, 46% of Missouri residents lived in these adjoining counties; 24 years later, in December 1984, it was estimated that exactly half of Missouri's 5,046,000 residents lived in counties bordering the Missouri River (Commercial Atlas and Marketing Guide 1989). In the future, increasing numbers of people will live in the Missouri River corridor, and they will opportunistically use the Missouri River as their playground.

This quantitative and qualitative information will be invaluable when future plans are formulated for wise water resource management of this increasingly important river.

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Table 1. Estimates of recreational use for the B segment of Missouri River (river miles 144-260), Jefferson City to 2 miles below Miami, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours			Average Length of Visits
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Fishing							
Trotline, Sport	8,160	7.4	790	186,020	29.5	18,840	22.8
Angling (Pole & Line)	25,190	23.0	1,700	112,590	17.9	8,630	4.5
Hoop Net	2,410	2.2	510	54,480	8.6	12,170	22.6
Trotline, Comm.	1,780	1.6	330	41,200	6.5	7,810	23.1
Trammel Net	660	0.6	130	4,800	0.8	1,090	7.3
Other	190	0.2	40	980	0.2	250	5.2
Subtotal	38,390	35.0	2,030	400,070	63.5	25,630	10.4
Camping, Dept. Sites	1,930	1.8	1,030	39,130	6.2	24,070	20.3
Camping, Other Sites	2,060	1.8	530	30,440	4.8	8,050	14.8
Hunting							
Waterfowl	4,810	4.4	950	22,410	3.6	4,700	4.7
Dove	1,080	1.0	650	2,920	0.5	1,820	2.7
Deer, Gun	340	0.3	140	2,080	0.3	910	6.1
Rabbit	420	0.4	90	1,430	0.2	330	3.4
Deer, Bow	150	0.1	30	460	0.1	110	3.1
Quail	200	0.2	70	380	0.1	160	1.9
Turkey	110	0.1	30	350	0.1	100	3.2
Squirrel	70	0.1	30	250	t ²	110	3.6
Raccoon	40	t ²	20	40	t ²	20	1.0
Subtotal	7,220	6.6	1,210	30,320	4.9	5,140	4.2
Passive Leisure	17,190	15.6	2,030	26,630	4.2	6,700	1.5

Table 1, Cont'd.

Activity	Visits			Hours			Average Length of Visits
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Boating	7,100	6.5	730	21,900	3.5	2,650	3.1
Picnicking, Other Sites ³	4,730	4.3	1,870	14,290	2.2	5,650	3.0
Sight-Seeing	16,420	15.0	1,150	11,980	1.9	990	0.7
Undifferentiated Use	2,140	2.0	450	9,280	1.5	3,260	4.3
Cottage Use	320	0.3	170	5,050	0.8	3,420	15.8
Swimming	520	0.5	160	3,690	0.6	2,340	7.1
Trapping	100	0.1	40	2,460	0.3	870	24.6
Floating	190	0.2	70	2,380	0.4	1,150	12.5
Gathering Products	1,070	1.0	220	1,650	0.3	330	1.5
Nature Study	570	0.5	150	1,580	0.3	790	2.8
Collecting Bait	990	0.9	330	1,380	0.2	460	1.4
Water Skiing	540	0.5	280	1,310	0.2	590	2.4
Picnicking, Dept. Sites	840	0.8	170	940	0.1	190	1.1
Frogging	230	0.2	50	620	0.1	160	2.7
Off-Road Vehicle	170	0.2	80	520	0.1	290	3.1
Target Shooting	340	0.3	90	440	0.1	140	1.3
Hiking	300	0.3	120	420	0.1	130	1.4
Spelunking	140	0.1	110	260	t ²	220	1.9
Rappelling	20	t ²	20	20	t ²	20	1.0
Subtotal	103,520	94.5	4,250	606,760	96.3	39,140	5.9
Camping, Stump Island ⁴	870	0.8		10,440	1.6		12.0
Tri County Days ⁴	5,200	4.7		13,000	2.1		2.5
Total	109,590	100.0		630,200	100.0		5.8

¹ Includes all camping except that on Department sites.² t < 0.05%.³ Includes all picnicking except that on Department sites.⁴ Total counts of visits and hours.

Table 2. Estimated visits and hours of recreational use by season for the B segment of Missouri River (river miles 144-260), Jefferson City to 2 miles below Miami, August 28, 1983 to August 25, 1984.

Activity	Fall		Winter		Spring & Summer		Total	
	Aug. 28, 1983 - Dec. 24, 1983		Dec. 25, 1983 Mar. 10, 1984		Mar. 11 - Aug. 25, 1984			
	Visits	Hours	Visits	Hours	Visits	Hours	Visits	Hours
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Trotline, Sport	3,320	75,570	110	870	4,730	109,580	8,160	7.4 186,020 29.5
Angling (Pole & Line)	6,320	26,920	200	710	18,670	84,960	25,190	23.0 112,590 17.9
Hoop Net	450	9,820	100	2,290	1,860	42,370	2,410	2.2 54,480 8.6
Trotline, Comm.	890	21,100			890	20,100	1,780	1.6 41,200 6.5
Camping, Dept. Sites	220	4,170	1,190	28,540	520	6,420	1,930	1.8 39,130 6.2
Camping, Other Sites ¹	1,150	11,630			910	18,810	2,060	1.8 30,440 4.8
Passive Leisure	5,690	5,720	1,030	1,100	10,470	19,810	17,190	15.6 26,630 4.2
Waterfowl Hunting	4,810	22,400				10	4,810	4.4 22,410 3.6
Boating	1,410	5,740	350	270	5,340	15,890	7,100	6.5 21,900 3.5
Picnicking, Other Sites ²	2,140	6,130			2,590	8,160	4,730	4.3 14,290 2.2
Tri-County Days ³					5,200	13,000	5,200	4.7 13,000 2.1
Sight-Seeing	4,460	3,610	2,710	1,680	9,250	6,690	16,420	15.0 11,980 1.9
Camping, Stump Island ³	880	3,920	410	3,020	870	10,440	870	0.8 10,440 1.6
Undifferentiated Use	20	480	10	10	850	2,340	2,140	2.0 9,280 1.5
Cottage Use	200	1,900	220	1,120	290	4,560	320	0.3 5,050 0.8
Trammel Net	340	3,060			240	1,780	660	0.6 4,800 0.8
Swimming	1,080	2,920			180	630	520	0.5 3,690 0.6
Dove Hunting	100	2,460					1,080	1.0 2,920 0.5
Trapping	60	280					100	0.1 2,460 0.3
Floating	340	2,070			130	2,100	190	0.2 2,380 0.4
Deer, Gun Hunting	220	260					340	0.3 2,080 0.3
Gathering Products	30	60	80	80	770	1,310	1,070	1.0 1,650 0.3
Nature Study	170	470	130	200	410	1,320	570	0.5 1,580 0.3
Rabbit Hunting	90	130	250	960			420	0.4 1,430 0.2
Collecting Bait	330	710	10	10	890	1,240	990	0.9 1,380 0.2
Water Skiing	50	290			210	600	540	0.5 1,310 0.2
Fishing, Other	150	300	70	60	140	690	190	0.2 980 0.2
Picnicking, Dept. Sites	10	10			620	580	840	0.8 940 0.1
Frogging	10	10			220	610	230	0.2 620 0.1
Off-Road Vehicle	10	t ⁴	70	260	90	260	170	0.2 520 0.1

Table 2, Cont'd.

Activity	Fall		Winter		Spring & Summer		Total	
	Aug. 28, 1983- Dec. 24, 1983		Dec. 25, 1983 Mar. 10, 1984		Mar. 11 - Aug. 25, 1984			
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent
Deer, Bow Hunting	150	460			140	200	150	0.1
Target Shooting	170	200	30	40	90	170	340	0.1
Hiking	170	170	40	80			300	0.1
Quail Hunting	170	330	30	50	60	230	200	0.1
Turkey Hunting	50	120					110	0.1
Spelunking	140	260			30	130	140	0.1
Squirrel Hunting	40	120					70	t ⁵
Raccoon Hunting	40	40					40	t ⁵
Rappelling			20	20			20	t ⁵
Total	35,870	213,830	7,060	41,370	66,660	375,000	109,590	100.0
Percent	32.7	33.9	6.5	6.6	60.8	59.5	100.0	100.0

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ Total counts of visits and hours.

⁴ t < 5.

⁵ t < 0.05%.

Table 3. Estimated number of fish caught, by all methods, for the B segment of Missouri River (river miles 144-260), Jefferson City to 2 miles below Miami, August 28, 1983 to August 25, 1984.

Species	Angling	Trotline (sport)	Trotline (comm.)	Hoop Net	Trammel Net	Other	Total
Channel Catfish	11,765	8,834	1,554	1,058	802	13	24,026
Blue Catfish	1,433	307	206	176	84	152	2,358
Flathead Catfish	4,116	2,336	319	495	307		7,573
Carp	1,775	534	399	3,027	791		6,526
Buffalo	598	86	351	2,228	646		3,909
Freshwater Drum	5,933	656	285	2,237	73		9,184
Largemouth Bass	318						318
Crappie	5,148	11	110	7			5,276
Bluegill	1,089	2					1,091
Sturgeon	289	10	18	176	373		866
Carp Sucker	51	46	11	22	315		445
Grass Carp	5			69	22		96
Paddlefish	24	5	32	85	82	47	275
Other Fish	1,799	45	11	103	112		2,070
Total Fish	34,343	12,872	3,296	9,683	3,607	212	64,013
Total Hours	112,590	186,020	41,200	54,480	4,800	980	400,070
Fish per Hour	0.31	0.07	0.08	0.18	0.75	0.22	0.16
Total Fishermen	25,190	8,160	1,780	2,410	660	190	38,390

Table 4. Estimated harvest and harvest rate per 100 hours of fish and wildlife taken from the B segment of the Missouri River (river miles 144-260), Jefferson City to 2 miles below Miami, August 28, 1983 to August 25, 1984.

Item	Total Harvest	Harvest Rate per 100 Hours
Fish	64,013	16
Frogs	28	5
Deer, Gun	4	t ¹
Dove	1,936	66
Rabbit	690	48
Quail	107	28
Squirrel	151	60
Turkey	13	4
Waterfowl, Total	6,616	30
Mallard	5,003	22
Teal	320	1
Other Ducks	997	4
Canada Geese	245	1
Snow Geese	51	t ¹

¹ t < 0.5/100 hours.

Table 5. Estimates of recreational use for all sites (5) except Department access sites for the lower section of the B segment of Missouri River (river miles 144-213), August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	2,980	8.7	590	69,110	35.9	14,280
Hoop Net	1,350	3.9	480	31,580	16.4	11,450
Angling (Pole & Line)	6,060	17.6	1,230	21,380	11.1	5,170
Trotline, Comm.	680	2.0	280	16,330	8.5	6,650
Camping, Other Sites ¹	990	2.9	300	14,320	7.4	4,020
Picnicking, Other Sites ²	3,610	10.5	1,820	11,630	6.0	5,550
Passive Leisure	9,580	27.9	1,940	9,250	4.8	1,500
Cottage Use	280	0.8	170	4,470	2.3	3,410
Sight-Seeing	6,030	17.5	850	4,350	2.3	750
Floating	130	0.4	60	2,080	1.1	1,140
Camping, Dept. Sites	240	0.7	240	1,930	1.0	1,930
Trapping	50	0.1	30	1,170	0.6	680
Boating	260	0.8	100	1,050	0.5	620
Gathering Products	600	1.7	200	790	0.4	250
Undifferentiated Use	280	0.8	90	560	0.3	320
Trammel Net	60	0.2	40	440	0.2	440
Deer, Gun Hunting	70	0.2	40	400	0.2	210
Target Shooting	200	0.6	90	290	0.2	130
Spelunking	140	0.4	110	260	0.1	220
Hiking	200	0.6	110	230	0.1	120
Collecting Bait	150	0.4	90	170	0.1	110
Quail Hunting	80	0.2	50	150	0.1	110
Swimming	30	0.1	30	120	0.1	120
Picnicking, Dept. Sites	110	0.3	110	110	0.1	110
Nature Study	60	0.2	60	90	t ³	90
Turkey Hunting	30	0.1	20	70	t ³	70
Off-Road Vehicle	50	0.1	30	70	t ³	50
Raccoon Hunting	40	0.1	20	40	t ³	20
Waterfowl Hunting	10	t ³	10	40	t ³	40
Rappelling	20	0.1	20	10	t ³	20
Total	34,370	100.0	3,070	192,490	100.0	21,420

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

Table 6. Estimates of recreational use for all sites (8) except Department access sites for the upper section of the B segment of Missouri River (river miles 213-260), August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	1,900	7.1	440	43,150	22.6	10,220
Angling (Pole & Line)	8,970	33.6	1,050	42,090	22.0	5,390
Camping, Dept. Sites	1,190	4.5	1,000	28,540	14.9	23,920
Waterfowl Hunting	4,600	17.2	950	21,700	11.4	4,700
Boating	2,590	9.7	480	9,460	5.0	2,070
Passive Leisure	1,880	7.0	520	8,730	4.6	6,510
Hoop Net	370	1.4	140	8,030	4.2	3,140
Camping, Other Sites ¹	660	2.5	380	7,960	4.2	4,680
Trotline, Comm.	250	0.9	70	6,010	3.1	1,800
Undifferentiated Use	770	2.9	230	3,580	1.9	1,310
Swimming	270	1.0	140	2,970	1.6	2,320
Picnicking, Other Sites ²	1,050	3.9	440	2,510	1.3	1,080
Deer, Gun Hunting	240	0.9	140	1,510	0.8	870
Trammel Net	140	0.5	50	1,130	0.6	680
Water Skiing	460	1.7	270	1,060	0.6	580
Trapping	30	0.1	20	810	0.4	470
Sight-Seeing	860	3.2	240	600	0.3	250
Fishing, Other	70	0.3	30	410	0.2	160
Off-Road Vehicle	80	0.3	70	270	0.1	260
Gathering Products	50	0.2	30	180	0.1	150
Frogging	50	0.2	30	110	0.1	70
Picnicking, Dept. Sites	140	0.5	80	70	t ³	40
Collecting Bait	30	0.1	30	50	t ³	50
Nature Study	10	t ³	10	30	t ³	30
Target Shooting	30	0.1	20	20	t ³	20
Dove Hunting	10	t ³	10	10	t ³	10
Total	26,700	100.0	2,290	190,990	100.0	30,130

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

Table 7. Estimates of recreational use for the Marion access site, Missouri River, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error or the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	1,130	11.7	230	27,250	47.0	5,630
Angling (Pole & Line)	2,460	25.5	250	9,520	16.4	890
Camping, Dept. Sites	340	3.5	120	6,440	11.1	1,700
Camping, Other Sites ¹	260	2.7	210	6,100	10.5	5,130
Sight-Seeing	3,330	34.5	530	1,760	3.0	270
Hoop Net	70	0.7	30	1,640	2.8	610
Boating	540	5.6	200	1,420	2.5	390
Undifferentiated Use	240	2.5	60	990	1.7	300
Passive Leisure	600	6.2	80	600	1.0	80
Swimming	120	1.2	60	490	0.8	230
Frogging	80	0.8	30	330	0.6	120
Picnicking, Dept. Sites	210	2.2	70	320	0.6	120
Floating	30	0.3	20	230	0.4	160
Trotline, Comm.	10	0.1	10	220	0.4	220
Waterfowl Hunting	50	0.5	20	190	0.3	80
Trammel Net	10	0.1	10	120	0.2	100
Picnicking, Other Sites ²	20	0.2	10	110	0.2	60
Rabbit Hunting	30	0.3	20	70	0.1	50
Gathering Products	60	0.6	40	70	0.1	70
Squirrel Hunting	20	0.2	10	60	0.1	40
Collecting Bait	50	0.5	t ³	20	t ⁴	t ³
Total	9,660	100.0	860	57,950	100.0	8,430

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 5.

⁴ t < 0.05%.

Table 8. Estimates of recreational use for the Providence access site, Perche Creek, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	1,040	15.9	110	23,200	43.9	2,470
Angling (Pole & Line)	2,570	39.2	260	15,360	29.0	3,800
Hoop Net	210	3.2	50	4,500	8.5	1,150
Boating	1,180	18.0	180	3,520	6.7	800
Trotline, Comm.	70	1.1	20	1,630	3.1	490
Camping, Other Sites ¹	120	1.8	50	1,460	2.8	610
Cottage Use	40	0.6	20	580	1.1	310
Undifferentiated Use	150	2.3	50	400	0.8	220
Sight-Seeing	360	5.5	70	320	0.6	100
Nature Study	100	1.5	30	310	0.6	120
Camping, Dept. Sites	30	0.5	20	220	0.4	160
Deer, Gun Hunting	20	0.3	20	160	0.3	160
Water Skiing	30	0.5	20	150	0.3	100
Passive Leisure	170	2.6	40	130	0.2	40
Gathering Products	60	0.9	30	120	0.2	60
Turkey Hunting	30	0.5	10	110	0.2	40
Collecting Bait	100	1.5	40	100	0.2	60
Hiking	50	0.8	20	100	0.2	40
Deer, Bow Hunting	40	0.6	10	90	0.2	30
Off-Road Vehicle	20	0.3	10	90	0.2	90
Waterfowl Hunting	20	0.3	10	60	0.1	40
Dove Hunting	10	0.2	10	50	0.1	30
Squirrel Hunting	20	0.3	10	50	0.1	30
Rabbit Hunting	10	0.2	10	40	0.1	20
Target Shooting	40	0.6	20	40	0.1	20
Frogging	10	0.2	10	30	0.1	30
Picnicking, Dept. Sites	30	0.5	30	30	0.1	30
Floating	10	0.2	10	30	0.1	30
Trammel Net	10	0.2	10	10	t ²	10
Rappelling	t ³	t ²	t ³	10	t ²	10
Total	6,550	100.0	510	52,900	100.0	4,860

¹ Includes all camping except that on Department sites.

² t < 0.05%.

³ t < 5.

Table 9. Estimates of recreational use for the Taylor's Landing access site, Missouri River, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	1,220	23.2	170	6,930	29.1	910
Trotline, Sport	290	5.5	80	6,790	28.5	1,850
Hoop Net	100	1.9	70	2,370	9.9	1,790
Boating	480	9.1	190	1,920	8.1	830
Sight-Seeing	1,610	30.6	180	1,320	5.5	160
Camping, Dept. Sites	60	1.1	20	1,140	4.8	440
Passive Leisure	630	12.0	110	780	3.3	150
Trammel Net	130	2.5	80	730	3.1	350
Collecting Bait	140	2.7	40	380	1.6	120
Picnicking, Dept. Sites	130	2.5	40	270	1.1	80
Undifferentiated Use	120	2.3	60	210	0.9	160
Camping, Other Sites ¹	10	0.2	10	200	0.8	200
Trotline, Comm.	10	0.2	10	140	0.6	120
Waterfowl Hunting	40	0.8	20	130	0.5	70
Nature Study	90	1.7	30	100	0.4	20
Fishing, Other	10	0.2	10	60	0.3	30
Gathering Products	20	0.4	20	60	0.3	40
Water Skiing	10	0.2	10	60	0.3	60
Target Shooting	30	0.6	10	50	0.2	20
Hiking	30	0.6	20	50	0.2	20
Rabbit Hunting	20	0.4	10	40	0.2	20
Swimming	40	0.8	40	40	0.2	40
Floating	20	0.4	20	40	0.2	40
Deer, Gun Hunting	10	0.2	10	10	t ²	10
Frogging	10	0.2	10	t ³	t ²	t ³
Total	5,260	100.0	420	23,820	100.0	3,090

¹ Includes all camping except that on Department sites.

² t < 0.05%.

³ t < 5.

Table 10. Estimates of recreational use for the Franklin Island Wildlife Area, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Comm.	320	4.3	40	6,360	20.4	960
Hoop Net	260	3.5	60	5,200	16.7	1,380
Trotline, Sport	200	2.7	70	4,740	15.2	1,620
Undifferentiated Use	450	6.0	370	3,200	10.2	2,940
Dove Hunting	1,060	14.1	650	2,860	9.2	1,820
Angling (Pole & Line)	820	10.9	150	2,270	7.3	450
Sight-Seeing	2,450	32.7	190	1,930	6.2	190
Rabbit Hunting	360	4.8	90	1,280	4.1	320
Nature Study	270	3.6	120	980	3.1	770
Passive Leisure	480	6.4	110	520	1.7	120
Deer, Bow Hunting	110	1.5	30	370	1.2	100
Trapping	10	0.1	10	240	0.8	240
Gathering Products	200	2.7	40	240	0.8	50
Quail Hunting	120	1.6	50	230	0.7	110
Waterfowl Hunting	70	0.9	30	190	0.6	90
Turkey Hunting	50	0.7	20	170	0.5	60
Collecting Bait	100	1.3	40	140	0.4	70
Camping, Dept. Sites	10	0.1	10	120	0.4	120
Frogging	30	0.4	20	60	0.2	50
Picnicking, Other Sites ¹	50	0.7	20	40	0.1	20
Fishing, Other	20	0.3	10	30	0.1	10
Off-Road Vehicle	10	0.1	10	30	0.1	30
Hiking	10	0.1	10	20	0.1	20
Target Shooting	20	0.3	20	10	t ²	10
Boating	20	0.3	20	t ³	t ²	t ³
Total	7,500	100.0	880	31,230	100.0	5,430

¹ Includes all picnicking except that on Department sites.

² $t < 0.05\%$.

³ $t < 5$.

Table 11. Estimates of recreational use for the DeBourgmont access site, Lamine River, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Comm.	330	5.8	130	7,890	30.2	3,090
Trotline, Sport	370	6.5	90	6,780	25.9	1,200
Angling (Pole & Line)	1,150	20.3	220	4,930	18.9	1,240
Boating	1,350	23.9	400	2,590	9.9	830
Sight-Seeing	1,010	17.8	430	1,100	4.2	470
Trammel Net	130	2.3	80	670	2.6	450
Passive Leisure	560	9.9	130	520	2.0	130
Collecting Bait	420	7.4	300	520	2.0	420
Fishing, Other	90	1.6	30	480	1.8	190
Squirrel Hunting	30	0.5	20	140	0.5	90
Hoop Net	10	0.2	t ¹	120	0.5	120
Gathering Products	30	0.5	20	100	0.4	80
Nature Study	40	0.7	40	70	0.3	80
Camping, Other Sites ²	t ¹	t ³	t ¹	60	0.2	60
Waterfowl Hunting	10	0.2	10	50	0.2	40
Picnic, Dept. Sites	70	1.2	30	50	0.2	20
Undifferentiated Use	30	0.5	10	40	0.2	20
Hiking	10	0.2	10	20	0.1	20
Swimming	20	0.4	20	10	t ³	t ¹
Total	5,660	100.0	1,120	26,140	100.0	4,830

¹ t < 5.

² Includes all camping except that on Department sites.

³ t < 0.05%.

Table 12. Estimates of recreational use for the Brunswick access site, Grand River, August 28, 1983 to August 25, 1984. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	1,940	24.8	170	10,110	32.4	930
Passive Leisure	3,290	42.1	190	6,100	19.5	430
Trotline, Sport	250	3.2	50	5,000	16.0	1,030
Trotline, Comm.	110	1.4	70	2,620	8.4	1,630
Boating	680	8.7	120	1,940	6.2	470
Trammel Net	180	2.3	40	1,700	5.4	450
Hoop Net	40	0.5	20	1,040	3.3	580
Camping, Dept. Sites	60	0.8	30	740	2.4	300
Sight-Seeing	770	9.8	90	600	1.9	50
Camping, Other Sites ¹	20	0.3	10	340	1.1	200
Undifferentiated Use	100	1.3	30	300	1.0	120
Trapping	10	0.1	10	240	0.8	120
Frogging	50	0.6	20	90	0.3	40
Picnicking, Dept. Sites	150	1.9	50	90	0.3	30
Gathering Products	50	0.6	20	90	0.3	30
Off-Road Vehicle	10	0.1	t ²	60	0.2	30
Swimming	40	0.5	30	60	0.2	40
Waterfowl Hunting	10	0.1	10	50	0.2	50
Water Skiing	40	0.5	30	40	0.1	30
Target Shooting	20	0.3	20	30	0.1	30
Total	7,820	100.0	440	31,240	100.0	2,900

¹ Includes all camping except that on Department sites.

² t < 5.

Table 13. Distance travelled, by percentage, on the Missouri River by 11,162 recreationists interviewed on the B segment (river miles 144 - 260), August 28, 1983 to August 25, 1984.

Distance (Miles)	Taylor's Franklin DeBour- mont ¹ Brunswick ¹ Section				Other Sites		Total	
	Marion ¹ Providence ¹	Taylor's Landing ¹ Island ¹	DeBour- mont ¹	Brunswick ¹	Lower	Upper	Number	Percent
0	87.3	76.6	84.8	98.9	96.5	94.3	10,214	91.5
1	0.1	3.7	0.6	0.2	0.3	0.9	87	0.8
2	1.1	5.8	1.7	0.2	0.3	0.6	150	1.3
3	2.6	2.8	2.5	0.4	1.3	0.6	146	1.3
4	2.7	1.6	3.2	0.1	0.7	1.7	140	1.3
5	0.1	2.0	0.9	t ²	0.7	1.6	76	0.7
6	0.9	0.7	2.2	t ²	0.4	0.1	58	0.5
7		1.0	2.0		0.3	0.3	41	0.4
8	1.1	1.1				0.6	50	0.4
9		0.1					2	t ²
10	0.4	3.1	1.1		0.7	0.1	93	0.8
11-15	1.9	1.1	1.0				67	0.6
16-20	1.8	0.3					33	0.3
21-25								
26-30								
31-35								
36-40								
41-45								
46-50								
51-100								
100+								
Total	1,635	1,526	816	1,417	915	1,502	11,162	100.0

¹ Missouri Department of Conservation access site.

² t < 0.05%.

Table 14. Distance traveled, by percentage, for 11,162 recreationists interviewed on the B segment of Missouri River (river miles 144-260), Jefferson City to 2 miles, below Miami, August 28, 1983 to August 25, 1984.

Distance (Miles)	Taylor's Franklin				Brunswick ¹		Other Sites		Total	
	Marion ¹	Providence ¹	Landing ¹	Island ¹	DeBourgmont ¹	Section	Lower	Upper	Number	Percent
0-5	9.7	15.1	12.0	51.9	8.2	62.5	32.9	48.7	3,623	32.5
6-24	76.2	73.7	71.0	22.2	61.4	20.4	61.7	32.9	5,679	50.9
25-49	8.9	5.8	7.4	20.1	18.3	7.1	3.0	11.5	1,107	9.9
50-99	1.4	1.1	5.0	1.0	6.0	2.0	0.7	1.9	224	2.0
100-249	2.9	1.3	2.7	2.6	2.6	6.5	1.0	4.6	347	3.1
250-499		0.3	0.1	0.9	0.7		0.4	0.2	34	0.3
500-999		0.2	0.5	0.7	0.7	0.4	0.1	0.1	33	0.3
1,000+	0.9	2.5	1.4	0.6	2.2	1.1	0.3	0.2	115	1.0
Total	1,635	1,526	816	1,417	915	1,502	1,547	1,804	11,162	100.0

¹ Missouri Department of Conservation access site.

Table 15. Percentage age and sex composition of 10,734 recreationists interviewed by season on the B segment of Missouri River (river miles 144-260), August 28, 1983 to August 25, 1984.

Season	<u>Age Brackets</u>								<u>Number of Recreationists Interviewed</u>	
	<u>Under 12</u>	<u>12-15</u>	<u>16-17</u>	<u>18-24</u>	<u>25-34</u>	<u>35-44</u>	<u>45-64</u>	<u>65+</u>	<u>Total</u>	<u>Percent</u>
<u>Male</u>										
Fall	4.3	4.2	1.5	13.0	21.3	24.2	20.4	11.1	2,840	
Winter	4.7	5.7	2.1	12.7	20.4	21.9	17.4	15.1	489	
Spring & Summer	8.0	6.6	2.1	13.1	20.5	21.8	17.1	10.8	4,842	
Total Percent	6.5	5.7	1.9	13.0	20.8	22.6	18.3	11.2	8,171	76.1
<u>Female</u>										
Fall	11.7	6.2	2.1	18.3	20.1	16.9	16.5	8.2	759	
Winter	8.0	4.4	2.7	27.4	23.0	19.5	12.4	2.6	113	
Spring & Summer	11.1	9.8	2.2	17.6	20.2	20.2	11.6	7.3	1,691	
Total Percent	11.1	8.5	2.2	18.3	20.3	19.2	13.1	7.3	2,563	23.9
<u>Male and Female Combined</u>										
Fall	5.9	4.7	1.6	14.1	21.0	22.6	19.6	10.5	3,599	
Winter	5.3	5.5	2.2	15.5	20.9	21.4	16.4	12.8	602	
Spring & Summer	8.8	7.4	2.1	14.3	20.4	21.4	15.7	9.9	6,533	
Total Percent	7.6	6.4	2.0	14.3	20.7	21.8	17.0	10.2	10,734	100.0

Table 16. Percentage permit and non-permit composition of 11,162 recreationists interviewed on the B segment of Missouri River (river miles 144-260), August 28, 1983 to August 25, 1984.

Category	Marion ¹	Providence ¹	Taylor's Frankl ¹ in Landing ¹	Island ¹	DeBourgmont ¹	Brunswick ¹	Other Sites		Total Interviews
							Lower	Upper	
							Section	Section	Number
									Percent
Fishing Permit	7.8	25.2	21.8	6.8	22.4	27.3	10.1	18.6	1,895
Hunting Permit	0.1	1.0	2.5	12.8	1.1	3.1	0.3	15.6	560
Combination Permit	21.8	39.4	8.6	5.6	1.4	2.8	12.2	3.0	1,407
Resident Commercial Permit	1.1	3.1	3.9	6.6	6.0	5.3	4.7	6.4	514
Non-Resident Commercial Permit		0.2				0.9		1.6	47
Non-Resident Fishing Permit	0.2	0.1			0.1	0.3		0.6	21
Trip Permit		0.1				0.2		0.3	9
Non-Resident Hunting Permit				0.4		0.1		0.1	9
Free	9.0	7.7	2.0	1.4	0.1	53.1	3.0	11.9	1,359
Total (Permit)	39.9	76.7	38.7	33.7	31.1	93.1	30.3	58.1	5,821
No Response	60.1	23.3	61.3	66.3	68.9	6.9	69.7	41.7	5,341
Total Interviewed	1,635	1,526	816	1,417	915	1,502	1,547	1,804	11,162
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

¹ Missouri Department of Conservation access site.

Table 17. Estimates of recreational use for the C segment of Missouri River (river miles 260-423), 2 miles below Miami to Atchison, Kansas, August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours			Average Length Of Visits
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Fishing							
Trotline, Sport	6,790	5.4	660	144,510	23.1	14,440	21.3
Angling (Pole & Line)	40,510	32.3	2,140	194,640	31.1	11,570	4.8
Hoop Net	1,950	1.6	280	44,920	7.2	6,580	23.0
Trotline, Comm.	360	0.3	100	8,020	1.3	2,410	22.3
Trammel Net	570	0.5	120	4,530	0.6	970	7.9
Other	30	0.1	30	400	0.1	300	13.3
Subtotal	50,210	40.1	2,340	397,020	63.4	21,340	7.9
Boating							
Picnicking, Other Sites ²	10,220	8.1	870	53,300	8.5	11,750	5.2
Passive Leisure	12,500	10.0	2,850	33,140	5.3	9,200	2.7
Camping, Other Sites ³	15,550	12.4	1,010	28,390	4.5	2,630	1.8
Trapping	1,410	1.1	350	25,140	4.0	5,020	17.8
	1,010	0.8	420	22,380	3.6	9,060	22.2
Hunting							
Waterfowl	2,400	1.9	740	7,940	1.3	2,600	3.3
Deer, Bow	970	0.8	190	3,210	0.5	580	3.3
Deer, Gun	570	0.5	120	2,460	0.3	580	4.3
Quail	650	0.5	440	2,370	0.4	1,820	3.6
Rabbit	380	0.3	130	1,270	0.2	520	3.3
Dove	270	0.2	110	640	0.1	290	2.4
Turkey	150	0.1	60	510	0.1	510	3.4
Squirrel	190	0.2	70	420	0.1	170	2.2
Subtotal	5,580	4.5	1,050	18,820	3.0	3,610	3.4

Table 17, Cont'd.

Activity	Visits			Hours			Average Length Of Visits
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Camping, Dept. Sites	930	0.7	240	16,410	2.5	4,500	17.6
Sight-Seeing	16,900	13.5	1,430	12,570	2.0	1,470	0.7
Undifferentiated Use	4,590	3.6	810	7,290	1.2	2,240	1.6
Gathering Products	1,670	1.3	210	2,450	0.4	370	1.5
Floating	1,050	0.8	690	2,420	0.4	800	2.3
Picnicking, Dept. Sites	1,160	0.9	230	2,370	0.4	700	2.0
Water Skiing	1,700	0.6	130	1,750	0.3	350	2.4
Nature Study	710	0.6	310	940	0.2	310	1.3
Frogging	130	0.1	60	470	0.1	210	3.6
Off-Road Vehicle	260	0.2	100	430	0.1	270	1.7
Hiking	530	0.4	190	400	0.1	150	0.8
Swimming	150	0.1	80	270	t ¹	190	1.8
Collecting Bait	110	0.1	80	200	t ¹	110	1.8
Target Shooting	130	0.1	70	120	t ¹	80	0.9
Spelunking	10	t ¹	10	10	t ¹	10	1.0
Total	125,510	100.0	5,170	626,290	100.0	33,060	5.0

¹ $t < 0.05\%$.² Includes all picnicking except that on Department sites.³ Includes all camping except that on Department sites.

Table 18. Estimated visits and hours of recreational use by season for the C segment of Missouri River (river miles 260-423), 2 miles below Miami to Atchison, Kansas, August 26, 1984 to August 24, 1985.

Activity	Fall		Winter		Spring & Summer		Total	
	Aug. 26, 1984- Dec. 22, 1984		Dec. 23, 1984- Mar. 9, 1985		Mar. 10 - Aug. 24, 1984			
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent
Angling (Pole & Line)	9,960	37,300	520	2,010	30,030	155,330	40,510	32.3
Trotline, Sport	3,180	74,830			3,610	69,680	6,790	5.4
Boating	2,550	19,670	130	170	7,540	33,460	10,220	8.1
Hoop Net	850	20,290			1,100	24,630	1,950	1.6
Picnicking, Other Sites ¹	5,110	16,530	560	480	6,830	16,130	12,500	10.0
Passive Leisure	5,280	7,980	1,900	4,460	8,370	15,950	15,550	12.4
Camping, Other Sites	510	5,650	70	1,110	830	18,380	1,410	1.1
Trapping	810	17,640	200	4,740			1,010	0.8
Camping, Dept. Sites ²	210	2,110	40	440	680	13,860	930	0.7
Sight-Seeing	4,760	3,980	1,070	450	11,070	8,140	16,900	13.5
Trotline, Comm.	160	3,340			200	4,680	360	0.3
Waterfowl Hunting	2,400	7,940					2,400	1.9
Undifferentiated Use	3,160	3,250	420	350	1,010	3,690	4,590	3.6
Trammel Net	110	410			460	4,120	570	0.5
Deer, Bow Hunting	970	3,210					970	0.8
Deer, Gun Hunting	570	2,460					570	0.5
Gathering Products	330	610	110	60	1,230	1,780	1,670	1.3
Floating	130	480			920	1,940	1,050	0.8
Picnicking, Dept. Sites	540	540	130	380	490	1,450	1,160	0.9
Quail Hunting	220	560	430	1,810			650	0.5
Water Skiing	150	330	190	720	550	1,420	700	0.6
Rabbit Hunting	190	550	t ³	10	230	500	380	0.3
Nature Study	480	430					710	0.6
Dove Hunting	270	640					270	0.2
Turkey Hunting	60	140					150	0.1
Frogging							130	0.1
Off-Road Vehicle	170	360	50	40	40	30	260	0.2
Squirrel Hunting	190	420			30	400	190	0.2
Fishing, Other							30	t ⁴

Table 18, Cont'd.

Activity	Fall		Winter		Spring & Summer		Total	
	Aug. 26, 1984 - Dec. 22, 1984		Dec. 23, 1984 - Mar. 9, 1985		Mar. 10 - Aug. 24, 1984			
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent
Hiking	370	280	120	60	40	60	530	0.4
Swimming	50	50			100	220	150	0.1
Collecting Bait	110	200					110	0.1
Target Shooting	60	70	20	10	50	40	130	0.1
Spelunking	10	10					10	t ⁴
Total	43,920	232,260	5,960	17,300	75,630	376,730	125,510	100.0
Percent	35.0	37.0	4.7	2.8	60.3	60.2	100.0	100.0

¹ Includes all picnicking except that on Department sites.

² Includes all camping except that on Department sites.

³ t < 5.

⁴ t < 0.05%.

Table 19. Estimated numbers of fish caught, by all methods, for the C segment of Missouri River (river miles 260-423), 2 miles below Miami to Atchison, Kansas, August 26, 1984 to August 24, 1985.

Species	Angling	Trotline (Sport)	Trotline (Comm.)	Hoop Net	Trammel Net	Other	Total
Channel Catfish	13,854	5,014	474	3,582	1,145	75	24,144
Blue Catfish	539	473	5	100			1,117
Flathead Catfish	10,428	2,958	231	2,046	347		16,010
Carp	10,714	3,314	65	6,712	2,839		23,644
Buffalo	775	758	33	3,075	2,327		6,968
Freshwater Drum	16,776	1,121	61	1,485	329		19,772
Walleye	110	8		80	13		211
Largemouth Bass	748	15		20			783
Crappie	16,946	6					16,952
Bluegill	107						107
Sturgeon	2,351		28	200	8		2,587
Carp Sucker	11			309			320
Grass Carp	89	132		68	43		332
Paddlefish	269	10		43	50		372
Other Fish	12,706	539		88	306		13,639
Total Fish	86,423	14,348	897	17,808	7,407	75	126,958
Total Hours	194,640	144,510	8,020	44,920	4,530	400	397,020
Fish per Hour	0.44	0.10	0.11	0.40	1.64	0.19	0.32
Total Fishermen	40,510	6,790	360	1,950	570	30	50,210

Table 20. Estimated harvest and harvest rate per 100 hours of fish and wildlife taken from the C segment of Missouri River (river miles 260-423), 2 miles below Miami to Atchison, Kansas, August 26, 1984 to August 24, 1985.

Item	Total Harvest	Harvest Rate per 100 Hours
Fish	126,958	32
Frogs	6	1
Deer, Gun	72	3
Dove	176	28
Rabbit	470	37
Quail	973	41
Squirrel	107	5
Turkey	6	1
Deer, Bow	25	1
Waterfowl, Total	2,613	33
Mallard	526	6
Teal	375	5
Other Ducks	1,414	18
Canada Geese	248	3
Snow Geese	50	1

Table 21. Estimates of recreational use for all sites (7) except Department access sites for the lower section of the C segment of Missouri River (river miles 260-322), August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	14,490	49.4	1,630	56,230	35.4	7,520
Trotline, Sport	1,280	4.4	280	26,080	16.4	6,740
Hoop Net	1,030	3.5	250	23,910	15.1	5,940
Trapping	840	2.9	420	18,420	11.6	9,000
Waterfowl Hunting	2,100	7.2	740	6,980	4.4	2,600
Passive Leisure	3,370	11.5	560	5,700	3.6	1,180
Trotline, Comm.	190	0.6	90	4,640	2.9	2,160
Camping, Other Sites ¹	160	0.5	80	3,820	2.4	1,950
Boating	1,460	5.0	310	3,660	2.3	1,130
Quail Hunting	600	2.0	440	2,230	1.4	1,820
Deer, Gun Hunting	450	1.5	100	1,800	1.1	400
Rabbit Hunting	360	1.2	130	1,230	0.8	520
Sight-Seeing	1,850	6.3	520	1,090	0.7	320
Dove Hunting	250	0.9	110	610	0.4	290
Trammel Net	60	0.2	40	420	0.3	300
Off-Road Vehicle	80	0.3	60	340	0.2	260
Frogging	60	0.2	30	280	0.2	160
Squirrel Hunting	120	0.4	50	230	0.1	110
Deer, Bow Hunting	70	0.2	50	210	0.1	150
Swimming	60	0.2	60	180	0.1	180
Floating	20	0.1	20	140	0.1	140
Gathering Products	140	0.5	70	140	0.1	80
Picnicking, Dept. Sites	170	0.6	80	120	0.1	40
Turkey Hunting	50	0.2	50	120	0.1	120
Target Shooting	50	0.2	50	60	t ²	60
Nature Study	20	0.1	20	50	t ²	50
Total	29,330	100.0	2,280	158,690	100.0	16,960

¹ Includes all camping except that on Department sites.

² t < 0.05%.

Table 22. Estimates of recreational use for all sites (5) except Department access sites for the middle section of the C segment of Missouri River (river miles 322-372), August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity ±	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error ±	Number	Percent	Standard Error
Angling (Pole & Line)	10,250	42.8	860	37,360	31.3	3,010
Trotline, Sport	1,270	5.3	210	28,700	24.1	4,870
Picnicking, Other Sites ¹	7,930	33.1	2,730	26,580	22.3	9,140
Hoop Net	390	1.6	80	8,580	7.2	1,920
Boating	1,050	4.4	190	4,370	3.7	1,040
Trapping	130	0.5	30	2,790	2.3	770
Trammel Net	320	1.3	100	2,420	2.0	650
Undifferentiated Use	530	2.2	500	2,030	1.7	1,970
Camping, Other Sites ²	360	1.5	270	1,950	1.6	930
Passive Leisure	600	2.5	210	1,140	1.0	380
Deer, Gun Hunting	120	0.5	70	640	0.5	420
Floating	130	0.5	50	600	0.5	230
Gathering Products	250	1.0	110	600	0.5	240
Picnicking, Dept. Sites	10	0.0	10	300	0.3	290
Sight-Seeing	190	0.8	90	240	0.2	110
Camping, Dept. Sites	20	0.1	20	210	0.2	160
Collecting Bait	110	0.5	80	200	0.2	110
Nature Study	170	0.7	90	180	0.2	90
Deer, Bow Hunting	60	0.3	60	160	0.1	160
Squirrel Hunting	40	0.2	40	140	0.1	140
Rabbit Hunting	10	t ³	10	30	t ³	30
Waterfowl Hunting	t ⁴	t ³	t ⁴	20	t ³	20
Off-Road Vehicle	10	t ³	10	10	t ³	10
Total	23,950	100.0	3,110	119,250	100.0	11,460

¹ Includes all picnicking except that on Department sites.

² Includes all camping except that on Department sites.

³ t < 0.05%.

⁴ t < 5.

Table 23. Estimates of recreational use for all sites (4) except Department access sites for the upper section of the C segment of Missouri River (river miles 372-423), August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	7,820	16.7	1,010	54,240	29.0	7,590
Trotline, Sport	2,010	4.3	410	39,060	20.9	7,390
Boating	5,150	11.0	620	28,700	15.3	4,280
Camping, Other Sites ¹	850	1.8	200	18,580	9.9	4,480
Hoop Net	510	1.1	90	11,950	6.4	2,070
Sight-Seeing	11,800	25.1	1,320	9,220	4.9	1,420
Picnicking, Other Sites ²	4,430	9.4	790	5,420	2.9	970
Passive Leisure	6,810	14.5	720	5,400	2.9	580
Undifferentiated Use	3,780	8.0	620	4,560	2.4	1,020
Trotline, Comm.	70	0.1	40	1,790	1.0	930
Water Skiing	690	1.5	160	1,720	0.9	380
Trammel Net	120	0.3	40	1,440	0.8	650
Gathering Products	860	1.8	150	1,070	0.6	260
Picnicking, Dept. Sites	480	1.0	150	920	0.5	350
Floating	150	0.3	50	810	0.4	300
Camping, Dept. Sites	200	0.4	150	760	0.4	520
Trapping	20	0.0	30	590	0.3	590
Hiking	520	1.1	180	370	0.2	140
Nature Study	380	0.8	290	320	0.2	230
Waterfowl Hunting	30	0.1	10	120	0.1	60
Swimming	90	0.2	60	90	t ³	60
Quail Hunting	30	0.1	20	80	t ³	80
Off-Road Vehicle	120	0.3	80	50	t ³	20
Target Shooting	40	0.1	50	40	t ³	40
Total	46,960	100.0	3,130	187,300	100.0	14,560

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

Table 24. Estimates of recreational use for the Miami access site, Missouri River, August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Passive Leisure	3,340	30.4	300	13,960	25.7	2,230
Trotline, Sport	470	4.3	90	10,530	19.3	2,020
Camping, Dept. Sites	450	4.1	180	10,390	19.1	4,250
Angling (Pole & Line)	2,580	23.5	210	8,670	15.9	700
Boating	1,870	17.0	190	4,990	9.2	600
Trotline, Comm.	60	0.5	20	1,250	2.3	480
Picnicking, Dept. Sites	400	3.6	150	900	1.7	520
Camping, Other Sites ¹	40	0.4	30	790	1.5	670
Sight-Seeing	1,220	11.1	140	660	1.2	70
Trapping	20	0.2	10	580	1.1	330
Undifferentiated Use	120	1.1	60	390	0.7	270
Nature Study	100	0.9	50	320	0.6	180
Trammel Net	70	0.6	30	250	0.5	100
Hoop Net	10	0.1	10	240	0.4	240
Frogging	70	0.6	50	190	0.3	140
Waterfowl Hunting	50	0.5	30	140	0.3	60
Picnicking, Other Sites ²	30	0.3	30	80	0.1	80
Hiking	10	0.1	10	30	0.1	40
Water Skiing	20	0.2	20	30	0.1	20
Gathering Products	20	0.2	20	10	t ³	10
Off-Road Vehicle	10	0.1	10	10	t ³	10
Spelunking	10	0.1	10	10	t ³	10
Floating	10	0.1	10	t ⁴	t ³	t ⁴
Total	10,980	100.0	740	54,420	100.0	6,980

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

⁴ t < 5.

Table 25. Estimates of recreational use at the Grand Pass Wildlife Area, Missouri River, August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	180	5.1	50	4,130	31.9	840
Deer, Bow Hunting	840	23.8	170	2,840	21.9	530
Angling (Pole & Line)	670	19.0	120	2,020	15.6	400
Passive Leisure	360	10.2	60	1,180	9.1	220
Waterfowl Hunting	200	5.7	40	620	4.8	140
Gathering Products	340	9.6	60	570	4.4	90
Sight-Seeing	650	18.4	90	500	3.9	80
Turkey Hunting	100	2.8	30	390	3.0	110
Trotline, Comm.	10	0.3	10	240	1.9	240
Undifferentiated Use	50	1.4	50	210	1.6	210
Nature Study	20	0.6	10	60	0.5	30
Quail Hunting	20	0.6	10	60	0.5	30
Squirrel Hunting	30	0.8	20	50	0.4	50
Dove Hunting	20	0.6	20	30	0.2	30
Picnicking, Dept. Sites	20	0.6	20	30	0.2	30
Deer, Gun Hunting	t ¹	t ²	t ¹	10	0.1	10
Rabbit Hunting	10	0.3	10	10	0.1	10
Target Shooting	10	0.3	10	10	0.1	10
Total	3,530	100.0	250	12,960	100.0	1,380

¹ t < 5.

² t < 0.05%.

Table 26. Estimates of recreational use at the Schimmel City access site, Platte River, August 26, 1984 to August 24, 1985. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard error \pm	Number	Percent	Standard error \pm
Angling (Pole & Line)	4,700	43.7	340	36,120	38.6	3,190
Trotline, Sport	1,580	14.7	370	36,010	38.4	8,910
Boating	690	6.4	450	11,580	12.4	10,810
Camping, Dept. Sites	260	2.4	70	5,050	5.4	1,360
Picnicking, Other Sites ¹	110	1.0	40	1,060	1.1	520
Passive Leisure	1,070	9.9	180	1,010	1.1	170
Floating	740	6.9	680	870	0.9	690
Sight-Seeing	1,190	11.1	120	860	0.9	110
Fishing, Other	30	0.3	30	400	0.4	300
Hoop Net	10	0.1	10	240	0.3	120
Trotline, Comm.	30	0.3	10	100	0.1	50
Undifferentiated Use	100	0.9	20	100	0.1	30
Picnicking, Dept. Sites	80	0.7	40	100	0.1	60
Waterfowl Hunting	20	0.2	10	60	0.1	20
Gathering Products	60	0.6	20	60	0.1	20
Off-Road Vehicle	40	0.4	20	20	0.0	10
Deer, Gun Hunting	t ²	t ³	t ²	10	t ³	10
Nature Study	20	0.2	20	10	t ³	10
Target Shooting	30	0.3	20	10	t ³	10
Total	10,760	100.0	1,200	93,670	100.0	20,280

¹ Includes all picnicking except that on Department sites.

² t < 5.

³ t < 0.05%.

Table 27. Distance travelled, by percentage, on the Missouri River by 13,423 recreationists on the C segment (river miles 260 - 423), August 26, 1984 to August 24, 1985.

Distance (miles)	Miami ¹	Grand Pass ¹	Schimmel City ¹	Other Sites			Total	
				Lower Section	Middle Section	Upper Section	Interviews Number	Percent
0	81.8	99.6	92.0	97.5	88.8	93.0	12,226	91.1
1	2.0		0.2	0.5	0.8	0.1	81	0.6
2	3.2	0.3	0.3	0.5	1.8	0.6	194	1.4
3	2.2		0.9	0.3	1.1	0.2	108	0.8
4	3.2		3.6	0.5	1.2	0.5	177	1.3
5	1.4	0.1	0.3	0.1	2.2	0.2	121	0.9
6	1.9		0.4	0.3	1.1	0.4	96	0.7
7	0.5				1.1	0.2	59	0.4
8	0.8		0.7	0.2	0.2	1.4	88	0.7
9	0.4				0.1	0.2	17	0.1
10	2.6		0.7		1.0	0.5	110	0.8
11-15				0.1	0.4	0.5	36	0.3
16-20			0.3		0.1	0.8	37	0.3
21-25			0.5			0.2	17	0.1
26-30						0.4	14	0.1
31-35						0.2	8	0.1
36-40								
41-45								
46-50						0.5	19	0.1
51-100			0.1		0.1	0.1	15	0.1
100+								
Total Interviewed	1,796	789	1,967	1,468	3,680	3,723	13,423	100.0

¹ Missouri Department of Conservation access site.

Table 28. Distance traveled by percentage, for 13,423 recreationists interviewed on the C segment of Missouri River (river miles 260-423), 2 miles below Miami to Atchison, Kansas, August 26, 1984 to August 24, 1985.

Distance (Miles)	Miami ¹	Grand Pass ¹	Schimmel City ¹	Other Sites			Total Interviews	
				Lower Section	Middle Section	Upper Section	Number	Percent
0-5	25.4	2.7	20.1	45.4	36.1	79.6	5,830	43.4
6-24	56.6	80.0	57.2	26.8	49.1	12.7	5,447	40.6
25-49	4.2	4.7	19.2	24.7	13.1	3.5	1,466	10.9
50-99	6.7	11.2	1.8	2.3	0.2	1.2	333	2.5
100-249	2.7	1.5	1.5	0.7	0.1	1.5	161	1.2
250-499	1.0		0.2		0.7	0.4	63	0.5
500-999	0.8			0.1	0.1	0.4	34	0.3
1,000+	2.5				0.5	0.7	89	0.7
Total Interviewed	1,796	789	1,967	1,468	3,680	3,723	13,423	100.0

¹ Missouri Department of Conservation access site.

Table 29. Percentage age and sex composition of 11,122 recreationists interviewed by season on C segment of Missouri River (river miles 260-423), August 26, 1984 to August 24, 1985.

Season	<u>Age Brackets</u>								<u>Number of Recreationists Interviewed</u>	
	Under 12	12-15	16-17	18-24	25-34	35-44	45-64	65+	Total	Percent
<u>Male</u>										
Fall	6.8	4.8	3.2	13.8	24.5	21.8	18.4	6.7	2,944	
Winter	5.3	1.6		16.4	19.6	20.6	21.2	15.3	189	
Spring & Summer	6.8	4.0	2.7	9.7	23.3	26.4	19.4	7.7	5,316	
Total Percent	6.7	4.2	2.8	11.3	23.6	24.7	19.1	7.6	8,449	76.0
<u>Female</u>										
Fall	10.3	3.9	2.1	23.6	19.1	20.4	16.4	4.2	760	
Winter	11.3	1.6		32.3	25.8	16.1	9.7	3.2	62	
Spring & Summer	11.5	4.0	2.9	14.5	26.5	22.8	13.3	4.5	1,851	
Total Percent	11.1	3.9	2.6	17.5	24.4	22.0	14.1	4.4	2,673	24.0
<u>Male and Female Combined</u>										
Fall	7.5	4.6	3.0	15.8	23.4	21.5	18.0	6.2	3,704	
Winter	6.8	1.6		20.3	21.1	19.5	18.3	12.4	251	
Spring & Summer	8.0	4.0	2.8	10.9	24.1	25.5	17.8	6.9	7,167	
Total Percent	7.8	4.1	2.8	12.8	23.8	24.0	17.9	6.8	11,122	100.0

Table 30. Percentage permit and non-permit composition of 13,423 recreationists interviewed on the C segment of Missouri River, (river miles 260-423), August 26, 1984 to August 24, 1985.

Category	Miami ¹	Grand Pass ¹	Schimmel City ¹	Other Sites			Total Interviews	
				Lower Section	Middle Section	Upper Section	Number	Percent
Fishing Permit	32.3	14.3	43.4	33.4	21.7	22.8	3,685	27.5
Hunting Permit	1.1	15.0	1.1	0.6	0.1	0.3	181	1.3
Combination Permit	12.7	43.1	1.6	35.8	7.1	0.9	1,420	10.6
Resident Commercial Permit	4.3	0.5	0.5	2.9	1.6	1.4	245	1.8
Non-Resident Commercial Permit	0.1	0.4	0.1			0.2	13	0.1
Non-Resident Fishing Permit	0.9	0.1	0.6			1.7	92	0.7
Trip Permit	0.1			0.1	0.1		6	t ²
Non-Resident Hunting Permit			0.1	0.1		0.2	9	0.1
Free	47.6	12.7	3.2	16.6	8.9	1.4	1,641	12.2
Total (Permit)	99.0	86.1	50.6	89.5	39.5	28.8	7,292	54.3
No Response	1.0	13.9	49.4	10.5	60.5	71.2	6,133	45.7
Total Interviewed	1,796	789	1,967	1,468	3,680	3,723	13,423	
Percent	100.0	100.0	100.0	100.0	100.0	100.0		100.0

¹ Missouri Department of Conservation access site.

² t < 0.05%.

Table 31. Estimates of recreational use for the D segment of Missouri River (river miles 423-553), Atchison, Kansas to the Missouri - Iowa line, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours			Average Length of Visits (Hours)
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Fishing							
Trotline, Sport	1,580	0.7	290	34,340	3.1	6,770	21.7
Angling (Pole & Line)	15,780	6.7	690	66,910	6.0	3,600	4.2
Hoop Net	1,270	0.5	140	26,490	2.4	3,180	20.9
Trotline, Comm.	230	0.1	70	4,720	0.4	1,610	20.5
Trammel Net	230	0.1	60	2,250	0.2	810	9.8
Fish, Other	130	0.1	60	280	t ¹	140	2.2
Subtotal	19,220	8.2	810	134,990	12.1	8,720	7.0
Boating	5,290	2.2	790	25,060	2.2	5,020	4.7
Camping, Other Sites ²	710	0.3	190	16,500	1.6	5,780	23.2
Sight-Seeing	27,530	11.6	1,290	15,820	1.4	1,390	0.6
Camping, Dept. Sites	580	0.2	130	11,440	1.0	2,940	19.7
Cottage Use	360	0.2	100	7,760	0.7	2,210	21.6
Passive Leisure	5,940	2.5	460	3,950	0.4	210	0.7
Hunting							
Deer, Bow	230	0.1	60	1,330	0.1	360	5.8
Deer, Gun	360	0.2	70	1,320	0.1	360	3.7
Waterfowl	160	0.2	50	590	0.1	210	3.7
Pheasant	110	t ¹	30	320	0.1	100	2.9
Squirrel	80	t ¹	20	170	t ¹	50	2.1
Quail	50	t ¹	30	120	t ¹	50	2.4
Dove	90	t ¹	40	80	t ¹	50	0.9
Turkey	30	t ¹	20	80	t ¹	70	2.7

Table 31, Cont'd.

Activity	Visits			Hours			Average Length of Visits (Hours)
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Hunting, Cont'd.							
Rabbit	20	t ¹	10	40	t ¹	520	2.0
Predator	50	t ¹	30	40	t ¹	20	0.8
Crow	10	t ¹	10	t ³	t ³	t ³	0.2
Subtotal	1,190	0.6	110	4,090	0.4	3,590	3.4
Gathering Products							
Hiking	1,500	0.6	210	2,830	0.3	580	1.9
Floating	1,000	0.4	900	2,800	0.2	2,700	2.8
Undifferentiated Use	350	0.2	140	2,750	0.2	1,370	7.9
Water Skiing	400	0.2	90	1,090	0.1	650	2.7
Picnicking, Other Sites ⁴	480	0.2	240	980	0.1	470	2.0
Nature Study	340	0.1	80	470	t ¹	120	1.4
Picnicking, Dept. Sites	330	0.1	80	430	t ¹	210	1.3
Collecting Bait	420	0.2	90	430	t ¹	130	1.0
Target Shooting	490	0.2	80	380	t ¹	80	0.8
Off-Road Vehicle	210	0.1	50	210	t ¹	50	1.0
Swimming	330	0.1	70	140	t ¹	30	0.4
Frogging	40	t ¹	30	60	t ¹	40	1.5
	50	t ¹	30	50	t ¹	30	1.0
Subtotal	66,760	28.2	2,330	232,230	20.7	14,110	3.5
Indian Cave State Park	133,530	56.4		267,060	23.8		2.0
Sight-Seeing, Picnicking ⁵							
Camping	12,130	5.1		582,240	51.8		48.0
Horseback Riding ⁵	2,440	1.0		4,880	0.4		2.0
Missouri Museum of River History ⁵	13,600	5.7		13,600	1.2		1.0

Table 31, Cont'd.

Activity	<u>Visits</u>			<u>Hours</u>			Average Length of Visits (Hours)
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Belle of Brownville	7,500	3.2		18,750	1.7		2.5
Excursion Boat ⁵							
Fishing Tournaments (7) ⁵	<u>970</u>	<u>0.4</u>		<u>4,990</u>	<u>0.4</u>		<u>5.1</u>
Total	236,930	100.0		1,123,750	100.0		4.7

¹ $t < 0.05\%$.

² Includes all camping except that on Department sites.

³ $t < 5$.

⁴ Picnicking, other sites, includes all picnicking except that on Department sites.

⁵ Total counts of visits and hours.

Table 32. Estimated visits and hours of recreational use by season for the D segment of Missouri River (river miles 423-553), Atchison, Kansas to the Missouri - Iowa state line, August 25, 1985 to August 23, 1986.

Activity	Total									
	Aug. 25, 1985- Dec. 21, 1985		Dec. 22, 1985- Mar. 8, 1986		Mar. 9 - Aug. 23, 1986		Visits		Hours	
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent	Number	Percent
Indian Cave State Park- Camping ¹	2,810	134,880	70	3,360	9,250	444,000	12,130	5.1	582,240	51.8
Indian Cave State Park- Sight-Seeing/Picnicking ¹	33,690	67,380	3,320	6,640	96,520	193,040	133,530	56.4	267,060	23.8
Angling (Pole & Line)	4,500	24,300	90	120	11,190	42,490	15,780	6.7	66,910	6.0
Trotline, Sport	600	12,720			980	21,620	1,580	0.7	34,340	3.1
Hoop Net	470	9,110			800	17,380	1,270	0.5	26,490	2.4
Boating	1,950	10,420			3,340	14,640	5,290	2.2	25,060	2.2
Belle of Brownville Excursion Boat ¹					7,500	18,750	7,500	3.2	18,750	1.7
Camping, Other Sites ²	170	3,960			540	12,540	710	0.3	16,500	1.6
Sight-Seeing	6,500	5,990	2,870	1,040	18,160	8,790	27,530	11.6	15,820	1.4
Missouri Museum of River History	3,950	3,950			9,650	9,650	13,600	5.7	13,600	1.2
Camping, Dept. Sites	300	5,730	80	1,960	200	3,750	580	0.2	11,440	1.0
Cottage Use					360	7,760	360	0.2	7,760	0.7
Fishing Tournaments (7) ¹	450	2,100			520	2,890	970	0.4	4,990	0.4
Indian Cave State Park- Horseback Riding ¹	860	1,720			1,580	3,160	2,440	1.0	4,880	0.4
Trotline, Comm.	10	90			220	4,630	230	0.1	4,720	0.4
Passive Leisure	1,230	880	320	130	4,390	2,940	5,940	2.5	3,950	0.4
Gathering Products	50	20			1,450	2,810	1,500	0.6	2,830	0.3
Hiking	20	10	30	50	950	2,740	1,000	0.4	2,800	0.2
Floating	150	1,310			200	1,440	350	0.2	2,750	0.2
Trammel Net	30	120	60	380	140	1,750	230	0.1	2,250	0.2
Deer, Bow Hunting	230	1,330					230	0.1	1,330	0.1
Deer, Gun Hunting	360	1,320					360	0.2	1,320	0.1
Undifferentiated Use	100	650	20	t ³	280	440	400	0.2	1,090	0.1
Water Skiing	390	840			90	140	480	0.2	980	0.1

Table 32, Cont'd.

Activity	Total									
	Aug. 25, 1985- Dec. 21, 1985		Dec. 22, 1985- Mar. 8, 1986		Mar. 9 - Aug. 23, 1986		Visits		Hours	
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent	Number	Percent
Waterfowl Hunting	160	590			310	450	160	0.1	590	0.1
Picnicking, Other Sites ⁴	30	20					340	0.1	470	t ⁵
Picnicking, Dept. Sites	210	300	60	10	150	120	420	0.2	430	t ⁵
Nature Study	110	310	50	20	170	100	330	0.1	430	t ⁵
Collecting Bait	130	150			360	230	490	0.2	380	t ⁵
Pheasant Hunting	60	200	50	120			110	t ⁵	320	0.1
Fishing, Other					130	280	130	0.1	280	t ⁵
Target Shooting	120	130	10	20	80	60	210	0.1	210	t ⁵
Squirrel Hunting	80	170					80	t ⁵	170	t ⁵
Off-Road Vehicle	90	30	40	20	200	90	330	0.1	140	t ⁵
Quail Hunting	50	120					50	t ⁵	120	t ⁵
Dove Hunting	90	80					90	t ⁵	80	t ⁵
Turkey Hunting	20	10					30	t ⁵	80	t ⁵
Swimming	20	30					30	t ⁵	60	t ⁵
Frogging	t ³	t ³	20	40	10	70	20	t ⁵	50	t ⁵
Rabbit Hunting	40	30	10	10	40	60	50	t ⁵	40	t ⁵
Hunting, Predator					30	20	20	t ⁵	40	t ⁵
Crow Hunting			10	t ³			10	t ⁵	t ³	t ⁵
Total	60,030	291,000	7,110	13,920	169,790	818,830	236,930	100.0	1,123,750	100.0
Percent	25.3	25.8	3.0	1.3	71.7	72.9	100.0			

1 Total counts of visits and hours.

2 Includes all camping except that on Department sites.

3 t < 5.

4 Includes all picnicking except that on Department sites.

5 t < 0.05%.

Table 33. Estimated numbers of fish caught, by all methods, for the D segment of Missouri River (river miles 423-553), Atchison, Kansas to the Missouri - Iowa state line, August 25, 1985 to August 23, 1986.

Species	Angling	Trotline (Sport)	Trotline (Comm.)	Hoop Net	Trammel Net	Other	Total
Channel Catfish	2,662	1,276	590	11,038	705		16,271
Blue Catfish	181	15	16	206			418
Flathead Catfish	4,365	880	305	2,468	160		8,178
Carp	3,528	397	460	9,956	2,650	285	17,276
Buffalo	5		5	1,702	962	8	2,682
Freshwater Drum	1,553	162	42	64	36		1,857
Walleye	20						20
Sturgeon	852	115		118	149		1,234
Carp Sucker				320	52		372
Grass Carp				47	104		151
Paddlefish				4			4
Other Fish	299	11	9	32	38		389
Total Fish	13,465	2,856	1,427	25,955	4,856	293	48,852
Total Hours	66,910	34,340	4,720	26,490	2,250	280	134,990
Fish per Hour	0.20	0.08	0.30	0.98	2.16	1.05	0.36
Total Fishermen	15,780	1,580	230	1,270	230	130	19,220

Table 34. Estimated harvest and harvest rate per 100 hours of fish and wildlife taken from the D segment of Missouri River (river miles 423-553), Atchison, Kansas, to the Missouri - Iowa state line, August 25, 1985 to August 23, 1986.

Item	Total Harvest	Harvest Rate per 100 Hours
Fish	48,852	36
Deer, Gun	38	3
Dove	10	13
Rabbit	4	10
Quail	3	3
Squirrel	78	46
Waterfowl, Total	38	6
Other Ducks	18	3
Snow Geese	20	3

Table 35. Estimates of recreational use for all sites (2) except Department access sites for The lower section of the D segment of Missouri River (river miles 423-488), August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Camping, Other Sites ¹	290	3.6	170	8,540	19.5	5,490
Cottage Use	360	4.5	100	7,690	17.5	2,210
Trotline, Sport	370	4.6	100	7,480	17.0	2,100
Angling (Pole & Line)	1,200	14.9	140	5,770	13.1	670
Sight-Seeing	3,210	39.8	370	3,630	8.3	1,220
Boating	990	12.3	270	3,510	8.0	960
Hoop Net	160	2.0	50	3,450	7.9	1,160
Passive Leisure	1,110	13.8	160	1,120	2.6	320
Trotline, Comm.	40	0.5	40	900	2.1	900
Camping, Dept. Sites	50	0.6	10	850	1.9	50
Trammel Net	20	0.2	20	380	0.9	330
Floating	110	1.4	80	310	0.7	230
Collecting Bait	70	0.9	40	90	0.2	60
Gathering Products	20	0.2	10	40	0.1	30
Picnicking, Dept. Sites	10	0.1	10	40	0.1	40
Swimming	30	0.4	30	40	0.1	40
Picnicking, Other Sites ²	20	0.2	20	20	t ³	20
Off-Road Vehicle	10	0.1	10	20	t ³	10
Total	8,070	100.0	600	43,880	100.0	6,630

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

Table 36. Estimates of recreational use for all sites (4) except Department access sites for the upper section of the D segment of Missouri River (river miles 488-553), August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	3,870	20.3	490	14,220	29.0	2,520
Boating	2,370	12.4	700	9,800	20.0	4,300
Hoop Net	400	2.1	110	8,410	17.1	2,400
Sight-Seeing	8,600	45.1	1,070	4,460	9.1	500
Trotline, Sport	140	0.7	70	2,440	5.0	1,070
Camping, Dept. Sites	110	0.6	80	2,330	4.7	1,650
Camping, Other Sites ¹	60	0.3	50	1,210	2.5	1,010
Floating	110	0.6	110	1,200	2.4	1,200
Passive Leisure	1,800	9.4	280	1,010	2.1	180
Trotline, Comm.	40	0.2	40	980	2.0	980
Water Skiing	410	2.2	230	790	1.6	470
Undifferentiated Use	70	0.4	50	640	1.3	600
Gathering Products	230	1.2	110	440	0.9	210
Picnicking, Other Sites ²	300	1.6	70	380	0.8	100
Deer, Gun Hunting	50	0.3	40	210	0.4	200
Picnicking, Dept. Sites	230	1.2	80	200	0.4	80
Nature Study	30	0.2	30	200	0.4	200
Squirrel Hunting	40	0.2	20	60	0.1	30
Off-Road Vehicle	120	0.6	50	30	0.1	20
Target Shooting	30	0.2	30	30	0.1	30
Deer, Bow Hunting	10	0.1	10	20	t ³	20
Collecting Bait	10	0.1	10	20	t ³	10
Hunting, Predator	30	0.2	30	10	t ³	10
Total	19,060	100.0	1,750	49,090	100.0	8,130

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

Table 37. Estimates of recreational use at the Worthwine Island access site, Missouri River, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	840	14.4	120	1,670	24.4	270
Sight-Seeing	3,190	54.6	260	1,210	17.7	130
Trotline, Sport	40	0.7	20	910	13.3	440
Camping, Other Sites ¹	30	0.5	10	570	8.3	300
Gathering Products	440	7.5	100	390	5.7	110
Fishing, Other	130	2.2	60	280	4.1	140
Camping, Dept. Sites	10	0.2	10	200	2.9	200
Deer, Gun Hunting	90	1.5	10	180	2.6	20
Target Shooting	150	2.6	40	160	2.3	40
Trotline, Comm.	10	0.2	10	130	1.9	130
Boating	10	0.2	10	120	1.8	120
Quail Hunting	50	0.9	30	120	1.8	50
Squirrel Hunting	40	0.7	10	110	1.6	40
Passive Leisure	190	3.3	40	100	1.5	20
Hiking	90	1.5	30	100	1.5	40
Picnic, Dept. Sites	40	0.7	40	80	1.2	80
Dove Hunting	80	1.4	40	80	1.2	50
Waterfowl Hunting	30	0.5	20	70	1.0	40
Cottage Use	t ²	t ³	t ²	70	1.0	70
Pheasant Hunting	40	0.7	10	60	0.9	10
Off-Road Vehicle	60	1.0	30	60	0.9	20
Collecting Bait	110	1.9	50	50	0.7	30
Deer, Bow Hunting	10	0.2	10	40	0.6	30
Nature Study	100	1.7	50	40	0.6	20
Frogging	40	0.7	30	40	0.6	30
Rabbit Hunting	10	0.2	10	10	0.1	10
Crow Hunting	10	0.2	10	t ²	t ³	t ²
Total	5,840	100.0	400	6,850	100.0	730

¹ Includes all camping except that on Department sites.

² t < 5.

³ t < 0.05%.

Table 38. Estimates of recreational use at the Nodaway Island access site, Missouri River, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	2,290	23.9	240	13,170	35.8	1,580
Boating	1,240	13.0	240	10,380	28.2	2,390
Trotline, Sport	140	1.5	70	3,290	9.0	1,710
Sight-Seeing	4,890	51.1	370	3,190	8.7	320
Hoop Net	100	1.0	30	2,410	6.6	740
Gathering Products	280	2.9	120	1,140	3.1	500
Camping, Dept. Sites	40	0.4	40	960	2.6	960
Trotline, Comm.	30	0.3	20	590	1.6	440
Floating	90	0.9	50	560	1.5	320
Deer, Gun Hunting	100	1.0	50	350	1.0	160
Deer, Bow Hunting	20	0.2	10	240	0.7	190
Passive Leisure	240	2.5	110	200	0.5	80
Trammel Net	30	0.3	10	90	0.2	50
Turkey Hunting	20	0.2	10	70	0.2	70
Picnic, Dept. Sites	10	0.1	10	50	0.1	50
Nature Study	40	0.4	20	50	0.1	30
Collecting Bait	10	0.1	10	10	t ¹	10
Off-Road Vehicle	t ²	t ¹	t ²	t ²	t ¹	t ²
Total	9,570	100.0	620	36,750	100.0	5,300

¹ t < 0.05%.

² t < 5.

Table 39. Estimates of recreational use at the Paynes Landing access site, Missouri River, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	340	9.1	150	8,280	33.7	3,650
Hoop Net	280	7.5	50	6,110	24.9	1,180
Angling (Pole & Line)	970	26.1	120	5,040	20.5	770
Trammel Net	100	2.7	40	1,510	6.2	720
Trotline, Comm.	70	1.9	30	1,370	5.6	640
Sight-Seeing	1,670	44.9	150	810	3.3	110
Floating	40	1.1	20	680	2.8	530
Camping, Dept. Sites	10	0.3	10	260	1.1	260
Boating	50	1.3	20	190	0.8	90
Passive Leisure	110	3.0	30	90	0.4	30
Waterfowl Hunting	20	0.5	10	90	0.4	60
Water Skiing	20	0.5	20	50	0.2	30
Deer, Gun Hunting	10	0.3	10	40	0.2	40
Gathering Products	10	0.3	10	20	0.1	20
Dove Hunting	10	0.3	10	t ¹	t ²	t ¹
Hiking	10	0.3	10	t ¹	t ²	t ¹
Total	3,720	100.0	250	24,540	100.0	4,080

¹ t < 5.

² t < 0.05%.

Table 40. Estimates of recreational use at the Thurnau State Wildlife Area, Missouri River, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	2,260	31.6	180	8,480	32.5	790
Camping, Dept. Sites	300	4.2	100	5,820	22.3	2,160
Hiking	900	12.6	900	2,700	10.4	2,700
Camping, Other Sites ¹	110	1.5	40	2,620	10.0	950
Trotline, Sport	90	1.3	40	1,780	6.8	520
Deer, Bow Hunting	130	1.8	50	780	3.0	260
Sight-Seeing	1,520	21.3	160	660	2.5	80
Gathering Products	300	4.2	80	570	2.2	160
Passive Leisure	710	9.9	100	510	2.0	80
Boating	300	4.2	60	470	1.8	110
Deer, Gun Hunting	70	1.0	40	450	1.7	230
Waterfowl Hunting	100	1.4	40	370	1.4	190
Trotline, Comm.	20	0.3	10	360	1.4	180
Pheasant Hunting	50	0.7	30	130	0.5	60
Picnic, Other Sites ²	20	0.3	10	70	0.3	50
Trammel Net	30	0.4	10	70	0.3	30
Undifferentiated Use	90	1.3	30	60	0.2	20
Nature Study	20	0.3	20	60	0.2	50
Picnic, Dept. Sites	30	0.4	10	30	0.1	10
Rabbit Hunting	10	0.1	10	30	0.1	30
Target Shooting	30	0.4	20	20	0.1	10
Hunting, Predator	10	0.1	10	10	t ³	10
Turkey Hunting	10	0.1	t ⁴	10	t ³	10
Frogging	10	0.1	10	10	t ³	10
Collecting Bait	30	0.4	20	10	t ³	10
Total	7,150	100.0	960	26,080	100.0	3,920

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 0.05%.

⁴ t < 5.

Table 41. Estimates of recreational use at the Langdon Bend access site, Missouri River, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	2,350	25.6	230	10,650	37.8	1,190
Hoopnet	290	3.2	40	5,060	18.0	910
Trotline, Sport	190	2.1	30	3,930	14.0	650
Camping, Other Sites ¹	210	2.3	60	3,320	11.8	1,080
Sight-Seeing	3,070	33.4	340	1,190	4.2	190
Camping, Dept. Sites	60	0.7	20	1,020	3.6	520
Passive Leisure	1,640	17.8	290	820	2.9	120
Boating	290	3.2	70	440	1.6	120
Trotline, Comm.	20	0.2	20	390	1.4	390
Undifferentiated Use	240	2.6	70	390	1.4	230
Gathering Products	210	2.3	40	210	0.7	30
Deer, Bow Hunting	40	0.4	20	190	0.7	140
Water Skiing	50	0.5	30	140	0.5	80
Trammel Net	30	0.3	20	80	0.3	70
Nature Study	140	1.5	60	80	0.3	40
Deer, Gun Hunting	30	0.3	10	70	0.2	70
Waterfowl Hunting	10	0.1	10	50	0.2	50
Picnic, Dept. Sites	100	1.1	20	30	0.1	10
Off-Road Vehicle	140	1.5	30	30	0.1	10
Collecting Bait	60	0.7	30	30	0.1	10
Hunting, Predator	10	0.1	10	20	0.1	20
Swimming	10	0.1	20	20	0.1	20
Pheasant Hunting	t ²	t ³	t ²	t ²	t ³	t ²
Fishing, Other	t ²	t ³	t ²	t ²	t ³	t ²
Total	9,190	100.0	610	28,160	100.0	1,910

¹ Includes all camping except that on Department sites.

² t < 5.

³ t < 0.05%.

Table 42. Estimates of recreational use at the Watson access site, Nishnabotna River, August 25, 1985 to August 23, 1986. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	2,000	48.1	190	7,910	46.9	980
Trotline, Sport	270	6.5	200	6,230	36.9	4,820
Hoop Net	40	1.0	20	1,050	6.2	470
Sight-Seeing	1,380	33.2	120	670	4.0	70
Camping, Other Sites ¹	10	0.2	10	240	1.4	240
Collecting Bait	200	4.8	40	170	1.0	40
Boating	40	1.0	20	150	0.9	100
Pheasant Hunting	20	0.5	20	130	0.8	130
Trammel Net	20	0.5	20	120	0.7	120
Passive Leisure	140	3.4	30	100	0.6	20
Deer, Bow Hunting	20	0.5	20	60	0.4	60
Deer, Gun Hunting	10	0.2	10	20	0.1	20
Gathering Products	10	0.2	10	20	0.1	20
Waterfowl Hunting	t ²	t ³	t ²	10	0.1	10
Nature Study	t ²	t ³	t ²	t ²	t ³	t ²
Total	4,160	100.0	350	16,880	100.0	5,360

¹ Includes all camping except that on Department sites.

² $t < 5$.

³ $t < 0.05\%$.

Table 43. Distance travelled, by percentage, on the Missouri River by 11,089 recreationists on the D segment (river miles 423 - 553) August 25, 1985 to August 23, 1986.

Distance (Miles)	Other Sites										Interviews	
	Worthwine ¹	Nodaway ¹	Godfrey Payne ¹	Thurnau ¹	Langdon Bend ¹	Watson ¹	Lower Section	Upper Section	Number	Percent	Number	Percent
0	99.9	66.9	66.8	94.8	90.7	79.2	93.5	84.8	9,350	84.3		
1		1.7	0.8	0.5	0.3	4.8	0.8	0.9	122	1.1		
2		3.9	4.7	0.8	1.2	7.1	1.7	4.1	303	2.7		
3		5.1	4.8	1.2	1.5	3.8	0.2	2.2	265	2.4		
4		6.2	7.3		1.8	1.7	0.1	2.0	278	2.5		
5		3.6	3.3	0.3	1.3	1.2	0.7	1.0	167	1.5		
6		3.4	4.9		0.5	1.5	0.9	0.6	155	1.4		
7		0.9	0.8		0.4		0.1		40	0.4		
8		1.7	1.3		0.2	0.2	0.5	0.3	62	0.6		t ²
9		0.1							3			
10		1.4	1.0	0.2	1.2	0.4	0.8	0.2	78	0.7		
11-15		1.7	2.0	1.9	0.5			1.2	105	0.9		
16-20	0.1	1.2	1.8	0.3	0.4		0.1	0.8	68	0.6		
21-25		0.8							18	0.2		
26-30		0.3				0.1		1.2	28	0.3		
31-35		0.6						0.7	26	0.2		t ²
36-40		0.2							5			
41-45		0.3					0.6		12	0.1		
46-50			0.5						4			t ²
51-100												
100+												
Total	1,331	2,193	796	1,296	1,926	917	1,015	1,615	11,089	100.0		

¹ Missouri Department of Conservation access site.

² t < 0.05%.

Table 44. Distance travelled, by percentage, for 11,089 recreationists interviewed on the D segment of Missouri River (river miles 423-553), Atchison, Kansas to the Missouri-Iowa state line, August 25, 1985 to August 23, 1986.

Distance (Miles)	Total									
	Worthwine ¹		Godfrey		Langdon		Watson ¹		Other Sites	
	Nodaway ¹	Payne ¹	Thurnau ¹	Bend ¹		Section	Upper	Number	Percent	
0-5	16.7	4.1	39.3	33.6	39.4	10.1	41.5	17.5	2,459	22.2
6-24	74.9	86.5	38.3	34.6	51.5	64.4	31.4	49.3	6,572	59.3
25-49	2.7	5.4	15.3	6.6	3.1	18.2	5.5	8.4	746	6.7
50-99	0.9	1.7	4.9	18.1	3.1	4.6	10.2	15.4	753	6.8
100-249	1.2	0.3	2.2	4.6	1.0	0.7	6.8	6.4	284	2.6
250-499	0.9	0.9		1.3	1.8	0.9	0.9	1.3	123	1.1
500-999	0.8	0.4		0.5	0.2	0.7	2.2	0.6	67	0.6
1,000+	1.9	0.7		0.5		0.4	1.5	1.1	85	0.8
Total Interviewed	1,331	2,193	183	1,296	1,926	917	1,015	1,615	11,089	100.0

Table 45. Percentage age and sex composition of 10,758 recreationists interviewed by season on the D segment of Missouri River (river miles 423-553), August 25, 1985 to August 23, 1986.

Season	<u>Age Brackets</u>								Number of Recreationists Interviewed	
	Under 12	12-15	16-17	18-24	25-34	35-44	45-64	65+	Total	Percent
<u>Male</u>										
Fall	6.3	3.3	1.6	8.5	20.6	19.6	27.7	12.4	2,307	
Winter	4.4	4.0	1.4	6.5	17.5	16.1	34.5	15.6	429	
Spring & Summer	6.7	3.4	2.5	8.2	17.4	20.9	30.0	10.9	5,488	
Total									8,224	
Percent	6.5	3.4	2.2	8.2	18.3	20.3	29.5	11.6		76.4
<u>Female</u>										
Fall	7.7	1.8	0.9	11.9	19.8	21.9	21.1	14.9	570	
Winter	12.9	2.9	0.7	7.1	13.6	13.6	36.4	12.8	140	
Spring & Summer	12.8	3.4	1.8	9.6	17.6	18.1	26.2	10.5	1,824	
Total									2,534	
Percent	11.6	3.1	1.5	10.0	17.9	18.7	25.6	11.6		23.6
<u>Male and Female Combined</u>										
Fall	6.6	3.0	1.5	9.2	20.4	20.1	26.3	12.9	2,877	
Winter	6.5	3.7	1.2	6.7	16.5	15.5	35.0	14.9	569	
Spring & Summer	8.2	3.4	2.3	8.6	17.5	20.2	29.0	10.8	7,312	
Total									10,758	
Percent	7.7	3.3	2.0	8.6	18.3	19.9	28.6	11.6		100.0

Table 46. Percentage permit and non-permit composition of 11,089 recreationists interviewed on the D segment of Missouri River (river miles 423-553), August 25, 1985 to August 23, 1986.

Category	Other Sites										Total Interviews	
	Worthwine ¹	Nodaway ¹	Godfrey Payne ¹	Thurnau ¹	Langdon Bend ¹	Watson ¹	Lower Section	Upper Section	Number	Percent	Number	Percent
Fishing Permit	15.0	19.6	32.9	24.6	8.0	33.4	18.6	7.9	1,987	17.9		
Hunting Permit	6.6	0.9	1.4	7.4	0.7	0.5		0.1	236	2.1		
Combination Permit	17.9	0.6	0.3	8.6	14.4		2.9	1.1	689	6.2		
Resident Commercial Permit	0.3	3.2	9.2	0.5	2.3	0.2	3.7	1.1	255	2.3		
Non-Resident Commercial Permit	0.1	0.2	0.1		0.1	0.4	0.1	0.8	27	0.2		
Non-Resident Fishing Permit	0.2	0.1	0.3	2.4	1.5	9.9	1.7	11.5	358	3.2		
Trip Permit	0.1			0.2	0.4		0.2	0.1	15	0.1		
Non-Resident Hunting Permit				0.5	0.1	0.2		0.1	12	0.1		
Free	4.1	1.7	5.4	5.9	3.5	0.3	2.6	2.4	347	3.1		
Total (Permit)	44.2	26.4	49.5	50.2	30.9	45.0	29.8	25.0	3,926	35.4		
No Response	55.8	73.6	50.5	49.8	69.1	55.0	70.2	75.0	7,163	64.6		
Total Interviewed	1,331	2,193	796	1,296	1,926	917	1,015	1,615	11,089			
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0		

¹ Missouri Department of Conservation access site.

Table 47. Estimates of recreational use for the A segment of Missouri River (river miles 0 - 144), confluence with the Mississippi River to Jefferson City, August 24, 1986 to August 22, 1987. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours			Average Length of Visits
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Fishing							
Trotline, Sport	7,460	5.3	560	177,640	27.1	13,380	23.8
Hoop Net	5,330	3.8	580	125,830	19.2	13,800	23.6
Angling (Pole & Line)	29,460	21.0	1,060	95,730	14.6	3,970	3.2
Trotline, Comm.	1,020	0.7	340	24,590	3.7	8,250	24.1
Fish, Other	630	0.5	90	3,380	0.5	730	5.4
Trammel Net	260	0.2	90	1,340	0.2	500	5.2
Subtotal	44,160	31.5	1,570	428,510	65.3	23,370	9.7
Boating	21,300	15.2	1,520	65,420	10.0	7,020	3.1
Camping, Dept. Sites	1,180	0.8	230	21,770	3.3	4,480	18.4
Cottage Use	920	0.7	180	18,640	2.8	3,900	20.3
Camping, Other Sites ¹	980	0.7	150	16,260	2.5	2,480	16.6
Sight Seeing	25,630	18.3	1,220	16,110	2.5	800	0.6
Passive Leisure	14,410	10.3	820	14,160	2.2	880	1.0
Trapping	640	0.5	130	14,000	2.1	3,020	21.8
Hunting							
Waterfowl	1,120	0.8	140	4,690	0.7	680	4.2
Squirrel	680	0.5	120	2,000	0.3	360	2.9
Dove	430	0.3	170	1,370	0.2	560	3.2
Rabbit	590	0.4	440	1,160	0.2	780	2.0
Deer, Gun	160	0.1	90	1,030	0.2	620	6.4
Turkey	140	0.1	30	830	0.1	170	5.9
Deer, Bow	120	0.1	40	700	0.1	250	5.8
Quail	160	0.1	150	230	t ²	190	1.4

Table 47, Cont'd.

Activity	Visits			Hours			Average Length of Visits
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm	
Hunting, Cont'd.							
Crow	180	0.1	150	230	t^2	150	1.3
Predator	<u>150</u>	<u>0.1</u>	<u>150</u>	<u>150</u>	<u>t^2</u>	<u>150</u>	<u>1.0</u>
Subtotal	3,730	2.7	930	12,390	1.9	1,770	3.3
Picnicking, Other Sites ³	5,980	4.3	750	10,740	1.6	1,740	1.8
Swimming	4,830	3.5	610	9,960	1.5	1,530	2.1
Undifferentiated Use	3,970	2.8	380	6,590	1.0	890	1.7
Water Skiing	2,400	1.7	360	6,430	1.0	1,040	2.7
Picnicking, Dept. Sites	4,080	2.9	400	6,060	0.9	1,120	1.5
Floating	250	0.2	110	2,160	0.3	1,110	8.6
Hiking	1,940	1.4	340	1,950	0.3	340	1.0
Gathering Products	1,190	0.9	190	1,460	0.2	300	1.2
Off-Road Vehicle	820	0.6	220	1,420	0.2	480	1.7
Collecting Bait	600	0.4	80	800	0.1	130	1.3
Nature Study	370	0.3	200	620	0.1	390	1.7
Rapelling	310	0.2	80	370	0.1	100	1.2
Target Shooting	230	0.2	70	360	0.1	110	1.6
Frogging	40	t^2	30	140	t^2	110	3.5
Spelunking	<u>10</u>	<u>t^2</u>	<u>20</u>	<u>20</u>	<u>t^2</u>	<u>20</u>	<u>2.0</u>
Total	139,970	100.0	4,270	656,340	100.0	29,690	4.7

¹ Includes all camping except that on Department sites.² $t < 0.05\%$.³ Includes all picnicking except that on Department sites.

Table 48. Estimated visits and hours of recreational use by season for the A segment of Missouri River (river miles 0 - 144), confluence with the Mississippi River to Jefferson City, August 24, 1986 to August 22, 1987.

Activity	Fall		Winter		Spring & Summer		Total	
	Aug. 24, 1986- Dec. 20, 1986		Dec. 21, 1986- Mar. 7, 1987		Mar. 8 - Aug. 22, 1987			
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent
Trotline, Sport	1,690	40,070	30	660	5,740	136,910	7,460	5.3
Hoop Net	1,970	45,520	180	3,920	3,180	76,390	5,330	3.8
Angling (Pole & Line)	7,760	27,560	2,300	7,120	19,400	61,050	29,460	21.0
Boating	3,450	15,450	560	930	17,290	49,040	21,300	15.2
Trotline, Comm.	460	11,340	310	7,390	250	5,860	1,020	0.7
Camping, Dept. Sites	310	7,390	20	370	850	14,010	1,180	0.8
Cottage Use	430	7,510	10	220	480	10,910	920	0.7
Camping, Other Sites ¹	450	7,480	10	180	520	8,600	980	0.7
Sight-Seeing	9,640	7,670	4,080	1,590	11,910	6,850	25,630	18.3
Passive Leisure	3,650	3,250	1,640	1,500	9,120	9,410	14,410	10.3
Trapping	360	8,680	280	5,320			640	0.5
Picnicking, Other Sites ²	720	1,130	330	230	4,930	9,380	5,980	4.3
Swimming	280	480			4,550	9,480	4,830	3.5
Undifferentiated Use	2,340	3,200	270	830	1,360	2,560	3,970	2.8
Water Skiing	170	390			2,230	6,040	2,400	1.7
Picnicking, Dept. Sites	1,090	2,480	100	120	2,890	3,460	4,080	2.9
Waterfowl Hunting	1,120	4,690					1,120	0.8
Fishing, Other	220	700			410	2,680	630	0.5
Floating	130	1,180			120	980	250	0.2
Squirrel Hunting	460	1,410	40	110	180	480	680	0.5
Hiking	450	710	130	230	1,360	1,010	1,940	1.4
Gathering Products	300	330	30	110	890	1,130	1,190	0.9
Off-Road Vehicle	520	880			270	430	820	0.6
Dove Hunting	430	1,370	120	780	30	210	430	0.3
Trammel Net	110	350	530	1,040			260	0.2
Rabbit Hunting	60	120					590	0.4
Deer, Gun Hunting	160	1,030					160	0.1
Turkey Hunting	t ³	20	20	20	140	810	140	0.1
Collecting Bait	220	200			360	580	600	0.4

Table 48, Cont'd.

Activity	Fall		Winter		Spring & Summer		Total	
	Aug. 24, 1986- Dec. 20, 1986		Dec. 21, 1986- Mar. 7, 1987		Mar. 8 - Aug. 22, 1987			
	Visits	Hours	Visits	Hours	Visits	Hours	Number	Percent
Deer, Bow Hunting	120	700			290	500	120	0.1
Nature Study	70	110	10	10	270	260	370	0.3
Rappelling	30	90	10	20	70	140	310	0.2
Target Shooting	120	160	40	60			230	0.2
Quail Hunting	10	50	150	180			160	0.1
Crow Hunting	20	20	160	210			180	0.1
Predator Hunting			150	150	40	140	150	0.1
Frogging							40	0.0
Spelunking	10	20					10	0.0
Total	39,330	203,740	11,550	33,300	89,100	419,310	139,970	100.0
							656,340	100.0

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ $t < 5$.

Table 49. Estimated number of fish caught, by all methods, for the A segment of Missouri River (river miles 0 - 144), confluence with the Mississippi River to Jefferson City, August 24, 1986 to August 22, 1987.

Species	Angling	Trotline (Sport)	Trotline (Comm.)	Hoop Net	Trammel Net	Other	Total
Channel Catfish	6,116	4,747	1,557	18,222	75	127	30,844
Blue Catfish	1,372	1,299	470	1,510	263	147	5,061
Flathead Catfish	2,953	2,494	680	2,813	37	37	9,014
Carp	1,476	476		27,242	203	13	29,410
Buffalo	158	473	8	18,364	344	8	19,355
Freshwater Drum	7,090	561	160	11,107		51	18,969
Largemouth Bass	1,176	39					1,215
Crappie	6,094	39					6,133
Bluegill	3,323	139					3,462
Sturgeon	467	151	37	1,796	1,907		4,358
Carp Sucker	57	284	62	5,976	76		6,455
Walleye	214						214
Paddlefish	36	6		61		47	150
Other Fish	1,580	88	11	61		13	1,753
Grass Carp			16	86	4		106
Total Fish	32,112	10,796	3,001	87,238	2,909	443	136,499
Total Hours	95,730	177,640	24,590	125,830	1,340	3,380	428,510
Fish per Hour	0.34	0.06	0.12	0.69	2.17	0.13	0.32
Total Fishermen	29,460	7,460	1,020	5,330	260	630	44,160

Table 50. Estimated harvest and harvest rate per 100 hours of fish and wildlife taken from the A segment of Missouri River (river miles 0 - 144), confluence with the Mississippi River to Jefferson City, August 24, 1986 to August 22, 1987.

Item	Total Harvest	Harvest Rate per 100 Hours
Fish	136,499	32
Frogs	25	18
Deer, Gun	3	t ¹
Deer, Bow	3	t ¹
Dove	619	45
Rabbit	3	t ¹
Crow	13	6
Squirrel	818	41
Turkey	10	1
Raccoon	506	4
Mink	78	1
Muskrat	138	1
Opposum	1205	9
Fox	64	t ¹
Beaver	154	1
Waterfowl, Total	500	11
Mallard	243	5
Teal	14	t ¹
Other Ducks	236	5
Canada Geese	7	t ¹

¹ t < 0.5/100 hours.

Table 51. Estimates of recreational use for all sites (3) except Department access sites for the Lower segment of the A segment of Missouri River (river miles 0 - 144), August 24, 1986 to August 22, 1987. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity ±	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error ±	Number	Percent	Standard Error
Hoop Net	1,300	3.8	280	29,380	27.1	6,330
Trotline, Sport	750	2.2	200	17,960	16.6	4,760
Angling (Pole & Line)	5,340	15.8	440	14,910	13.8	1,590
Trotline, Comm.	380	1.1	170	8,830	8.2	3,960
Boating	3,170	9.4	790	8,730	8.1	2,390
Picnic, Dept. Sites	1,670	4.9	280	1,400	5.0	240
Sight-Seeing	8,530	25.2	850	4,830	4.5	530
Undifferentiated Use	2,880	8.5	350	4,190	3.9	780
Camping, Dept. Sites	150	0.4	80	1,900	1.8	960
Trapping	80	0.3	30	1,470	1.4	480
Passive Leisure	5,410	16.0	280	5,400	1.3	240
Camping, Other Sites ¹	160	0.5	80	1,150	1.1	570
Off-Road Vehicle	640	1.9	210	1,060	1.0	460
Floating	90	0.3	90	1,000	0.9	1,000
Dove Hunting	220	0.6	110	850	0.8	430
Hiking	1,120	3.3	270	740	0.7	230
Swimming	320	0.9	140	730	0.7	360
Fishing, Other	90	0.3	40	590	0.5	240
Cottage Use	90	0.2	70	570	0.5	470
Waterfowl Hunting	110	0.3	50	500	0.5	280
Picnicking, Other Sites ²	240	0.7	90	440	0.4	250
Gathering Products	420	1.2	80	330	0.3	60
Squirrel Hunting	90	0.3	50	290	0.3	160
Target Shooting	80	0.2	40	170	0.2	80
Water Skiing	80	0.2	80	160	0.1	160
Rappelling	180	0.5	70	160	0.1	70
Deer, Bow Hunting	30	0.1	30	140	0.1	140
Rabbit Hunting	40	0.1	40	130	0.1	130
Trammel Net	60	0.2	30	120	0.1	60
Collecting Bait	80	0.2	30	80	0.1	40
Nature Study	50	0.1	40	60	0.1	40
Turkey Hunting	10	t ³	10	20	t ³	20
Total	33,860	100.0	2,210	108,290	100.0	13,250

¹ Includes all camping except that on Department sites.

² Includes all picnicking, except that on Department sites.

³ t < 0.05%.

Table 52. Estimates of recreational use for all sites (3) except Department access sites for the upper section of the A segment of Missouri River (river miles 65 - 144), August 24, 1986 to August 22, 1987. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity ±	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error ±	Number	Percent	Standard Error
Hoop Net	2,670	9.0	480	64,060	35.5	11,570
Trotline, Sport	2,110	7.1	370	50,690	28.1	8,840
Boating	6,150	20.7	700	24,420	13.5	5,420
Angling (Pole & Line)	2,970	10.0	230	14,220	7.9	1,200
Picnic, Other Sites ¹	4,200	14.1	610	6,810	3.8	1,390
Sight-Seeing	5,810	19.5	580	4,730	2.6	420
Passive Leisure	3,340	11.2	410	3,270	1.8	390
Trapping	120	0.4	40	3,090	1.7	940
Camping, Other Sites ²	170	0.6	60	1,780	1.0	580
Waterfowl Hunting	240	0.8	70	1,350	0.7	430
Water Skiing	520	1.7	180	1,280	0.7	440
Camping, Dept. Sites	50	0.2	40	1,170	0.6	970
Floating	110	0.4	50	910	0.5	460
Undifferentiated Use	240	0.8	90	660	0.4	320
Deer, Gun Hunting	80	0.3	80	610	0.3	610
Fishing, Other	110	0.4	30	450	0.2	150
Gathering Products	310	1.0	110	440	0.2	140
Picnic, Dept. Sites	410	1.4	100	390	0.2	100
Squirrel Hunting	40	0.1	40	110	0.1	110
Hiking	70	0.2	40	40	t ³	20
Nature Study	10	t ³	10	30	t ³	30
Collecting Bait	20	0.1	10	30	t ³	20
Target Shooting	t ⁴	t ³	t	t	t ³	t
Total	29,750	100.0	29,750	180,540	100.0	15,330

¹ Includes all picnicking except that on Department sites.

² Includes all camping except that on Department sites.

³ t < 0.05%.

⁴ t < 5.

Table 53. Estimates of recreational use for the Howell Island access site, Missouri River, August 24, 1986 to August 22, 1987. At the 67 percent level of probability, the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity ±	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error ±	Number	Percent	Standard Error
Angling (Pole & Line)	4,670	38.1	320	13,810	44.7	1,150
Trotline, Sport	300	2.4	70	7,410	24.0	1,680
Sight-Seeing	3,060	24.9	340	1,760	5.7	350
Passive Leisure	1,430	11.7	190	1,410	4.6	170
Waterfowl Hunting	180	1.5	80	800	2.6	330
Hoop Net	20	0.2	20	650	2.1	640
Boating	460	3.7	90	590	1.9	150
Turkey Hunting	80	0.7	10	530	1.7	70
Fishing, Other	130	1.1	30	510	1.7	200
Collecting Bait	300	2.4	60	470	1.5	100
Picnic, Dept. Sites	480	3.9	110	360	1.2	110
Deer, Gun Hunting	60	0.5	20	340	1.1	130
Hiking	170	1.4	30	290	0.9	70
Off-Road Vehicle	120	1.0	40	240	0.8	90
Camping, Dept. Sites	20	0.2	20	220	0.7	150
Undifferentiated Use	170	1.4	50	200	0.6	60
Rabbit Hunting	60	0.5	30	170	0.6	100
Deer, Bow Hunting	30	0.2	10	160	0.5	70
Squirrel Hunting	40	0.3	20	140	0.5	80
Picnic, Other Sites ¹	60	0.5	50	120	0.4	120
Gathering Products	110	0.9	40	120	0.4	50
Swimming	80	0.7	40	120	0.4	70
Target Shooting	90	0.7	40	120	0.4	60
Camping, Other Sites ²	10	0.1	10	100	0.3	70
Dove Hunting	40	0.3	20	70	0.2	30
Crow Hunting	10	0.2	10	60	0.2	10
Nature Study	30	0.2	20	50	0.2	20
Rappelling	50	0.4	20	50	0.2	20
Total	12,260	100.0	660	30,870	100.0	2,180

¹ Includes all picnicking except that on Department sites.

² Includes all camping except that on Department sites.

Table 54. Estimates of recreational use for the Weldon Spring access, Missouri River, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Angling (Pole & Line)	4,830	32.0	470	15,570	29.9	1,660
Trotline, Sport	500	3.3	80	10,980	21.1	1,830
Hoop Net	250	1.7	70	5,820	11.2	1,750
Boating	1,410	9.4	280	3,330	6.4	790
Camping, Other Sites ¹	160	1.1	60	3,270	6.3	1,250
Camping, Dept. Sites	250	1.7	120	3,220	6.2	1,460
Sight-Seeing	3,670	24.3	520	1,870	3.6	190
Waterfowl Hunting	430	2.9	70	1,410	2.7	260
Hiking	550	3.6	200	850	1.6	240
Rabbit Hunting	480	3.2	440	840	1.6	770
Fishing, Other	160	1.1	50	620	1.2	210
Squirrel Hunting	190	1.3	40	570	1.1	140
Nature Study	260	1.7	190	470	0.9	380
Dove Hunting	170	1.1	130	450	0.9	160
Swimming	130	0.9	130	450	0.9	450
Passive Leisure	650	4.3	130	420	0.8	80
Trammel Net	70	0.5	20	330	0.6	180
Trotline, Comm.	10	0.1	10	240	0.5	170
Turkey Hunting	40	0.3	30	240	0.5	150
Quail Hunting	160	1.1	150	230	0.4	190
Undifferentiated Use	120	0.8	40	210	0.4	100
Crow Hunting	170	1.1	150	170	0.3	150
Predator Hunting	150	1.0	150	150	0.3	150
Picnicking, Dept. Sites	120	0.7	40	110	0.2	30
Off-Road Vehicle	40	0.3	30	100	0.2	80
Water Skiing	40	0.3	40	80	0.2	80
Target Shooting	40	0.3	20	60	0.1	30
Rappelling	30	0.2	10	30	0.1	10
Spelunking	10	0.1	10	20	t ²	20
Gathering Products	10	0.1	10	10	t ²	10
Total	15,100	100.0	1,570	52,120	100.0	5,140

¹ Includes all camping except that on Department sites.

² t < 0.05%.

Table 55. Estimates of recreational use for the Colter's Landing access, Boeuf Creek, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity ±	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error ±	Number	Percent	Standard Error
Trotline, Sport	710	9.6	110	16,950	50.4	2,660
Angling (Pole & Line)	2,570	34.8	290	7,580	22.5	940
Boating	1,710	23.1	340	2,560	7.6	630
Camping, Dept. Sites	80	1.1	60	1,700	5.1	1,450
Fishing, Other	30	0.4	20	790	2.3	590
Picnic, Dept. Sites	310	4.2	80	510	1.5	140
Passive Leisure	340	4.6	40	410	1.2	50
Hoopnet	20	0.3	20	360	1.1	360
Waterfowl Hunting	120	1.6	10	360	1.1	100
Sight-Seeing	770	10.4	90	350	1.0	50
Camping, Other Sites ¹	20	0.3	20	340	1.0	270
Trapping	50	0.7	20	330	1.0	140
Gathering Products	140	1.9	110	280	0.8	240
Trotline, Comm.	20	0.1	10	260	0.8	260
Squirrel Hunting	80	1.1	30	190	0.6	80
Picnic, Other Sites ²	80	1.1	30	170	0.5	80
Swimming	120	1.6	80	170	0.5	120
Rappelling	50	0.7	20	130	0.4	70
Undifferentiated Use	70	0.9	20	80	0.2	30
Collecting Bait	70	0.9	30	70	0.2	30
Floating	10	0.1	10	40	0.1	40
Turkey Hunting	t ³	t ⁴	t ³	20	0.1	10
Nature Study	20	0.3	10	10	t ⁴	t ³
Off-Road Vehicle	10	0.1	10	t ³	t ⁴	t ³
Target Shooting	t ³	t ⁴	t ³	t ³	t ⁴	t ³
Total	7,400	100.0	710	33,660	100.0	3,370

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 5.

⁴ t < 0.05%.

Table 56. Estimates of recreational use for the Gasconade Park access, Gasconade River, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity ±	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error ±	Number	Percent	Standard Error
Trotline, Sport	1,220	7.7	210	29,100	26.7	5,010
Cottage Use	830	5.2	170	17,950	16.4	3,870
Trotline, Comm.	580	3.8	300	14,470	13.3	7,210
Angling (Pole & Line)	3,090	19.4	450	9,680	8.9	1,730
Boating	3,580	22.5	720	8,860	8.1	1,870
Trapping	270	1.7	120	6,380	5.8	2,760
Camping, Dept. Sites	290	1.8	140	5,840	5.3	3,250
Swimming	1,720	10.8	440	2,920	2.7	870
Picnic, Other Sites ¹	1,250	7.8	420	2,800	2.6	990
Hoop Net	120	0.8	30	2,720	2.5	610
Water Skiing	960	6.0	200	2,310	2.1	510
Camping, Other Sites ²	100	0.6	40	1,810	1.7	810
Picnic, Dept. Sites	540	3.4	200	1,800	1.6	870
Deer, Bow Hunting	60	0.4	30	400	0.4	190
Undifferentiated Use	130	0.8	40	370	0.3	110
Squirrel Hunting	120	0.8	70	370	0.3	210
Sight-Seeing	440	2.8	60	340	0.3	60
Passive Leisure	360	2.3	90	300	0.3	80
Fishing, Other	40	0.3	20	170	0.2	100
Trammel Net	30	0.2	20	170	0.2	100
Gathering Products	110	0.7	30	160	0.1	50
Deer, Gun Hunting	20	0.1	10	80	0.1	40
Collecting Bait	20	0.1	20	70	0.1	60
Waterfowl Hunting	10	0.1	10	50	t ³	40
Frogging	20	0.1	10	50	t ³	50
Floating	10	0.1	10	20	t ³	20
Total	15,930	100.0	2,120	109,190	100.0	16,380

¹ Includes all picnicking except that on Department sites.

² Includes all camping except that on Department sites.

³ t < 0.05%.

Table 57. Estimates of recreational use for the Chamois access, Missouri River, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	410	10.9	80	9,880	63.7	2,020
Passive Leisure	1,240	33.1	80	1,080	7.0	110
Sight-Seeing	1,370	36.5	120	770	5.0	90
Trapping	30	0.8	20	720	4.6	360
Angling (Pole & Line)	210	5.6	60	660	4.3	220
Hoop Net	20	0.5	20	540	3.5	380
Camping, Dept. Sites	20	0.5	20	480	3.1	480
Undifferentiated Use	130	3.5	40	340	2.2	110
Boating	100	2.7	40	250	1.6	100
Fishing, Other	70	1.9	30	250	1.6	110
Picnicking, Other Sites ¹	80	2.1	40	200	1.3	150
Waterfowl Hunting	20	0.5	20	150	1.0	100
Floating	10	0.3	10	130	0.8	130
Turkey Hunting	10	0.3	10	20	0.1	20
Rabbit Hunting	10	0.3	10	20	0.1	20
Gathering Products	10	0.3	10	10	0.1	10
Picnicking, Dept. Sites	10	0.3	10	10	0.1	10
Nature Study	t ²	t ³	t ²	t ²	t ³	t ²
Collecting Bait	t ²	t ³	t ²	t ²	t ³	t ²
Total	3,750	100.0	200	15,510	100.0	2,350

¹ Includes all picnicking except that on Department sites.

² t < 5.

³ t < 0.05%.

Table 58. Estimates of recreational use for the Mokane access, Missouri River, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Hoop Net	400	8.1	60	9,560	32.1	1,360
Trotline, Sport	320	6.5	70	7,580	25.4	1,610
Angling (Pole & Line)	1,690	34.1	240	6,460	21.7	1,360
Boating	500	10.1	100	1,720	5.8	370
Sight-Seeing	920	18.5	90	770	2.6	80
Trapping	30	0.6	10	750	2.5	220
Camping, Other Sites ¹	60	1.2	60	750	2.5	750
Trammel Net	100	2.0	70	630	2.1	450
Passive Leisure	540	10.9	90	620	2.1	100
Water Skiing	100	2.0	60	350	1.2	200
Picnicking, Dept. Sites	160	3.2	40	200	0.7	70
Undifferentiated Use	30	0.6	20	180	0.6	180
Camping, Dept. Sites	10	0.2	10	90	0.3	90
Waterfowl Hunting	10	0.2	10	70	0.2	50
Collecting Bait	60	1.2	20	40	0.1	20
Off-Road Vehicle	10	0.2	10	20	0.1	20
Squirrel Hunting	10	0.2	10	20	0.1	20
Gathering Products	<u>10</u>	<u>0.2</u>	<u>10</u>	<u>10</u>	<u>t²</u>	<u>10</u>
Total	4,960	100.0	470	29,820	100.0	4,230

¹ Includes all camping except that on Department sites.

² $t < 0.05\%$.

Table 59. Estimates of recreational use for the Bonnots Mill access, Osage River, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	Visits			Hours		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Boating	3,780	35.4	670	14,070	24.4	3,070
Trotline, Sport	530	5.0	80	12,560	21.8	1,870
Camping, Other Sites ¹	280	2.6	70	6,670	11.6	1,570
Camping, Dept. Sites	260	2.4	70	6,270	10.9	1,740
Angling (Pole & Line)	1,550	14.5	280	5,260	9.1	930
Swimming	1,670	15.6	350	4,020	7.0	1,060
Hoop Net	130	1.2	30	3,090	5.4	720
Water Skiing	700	6.6	220	2,250	3.9	100
Picnicking, Dept. Sites	220	2.1	90	960	1.7	600
Trapping	30	0.3	10	700	1.2	330
Passive Leisure	560	5.2	70	660	1.1	120
Sight-Seeing	750	7.0	80	420	0.7	50
Trotline, Comm.	10	0.1	10	250	0.4	200
Picnicking, Other Sites ²	70	0.7	40	200	0.3	130
Undifferentiated Use	90	0.8	30	140	0.2	50
Cottage Use	t ³	t ⁴	tt ³	120	0.2	120
Collecting Bait	20	0.2	10	30	0.1	20
Squirrel Hunting	20	0.2	10	30	0.1	20
Gathering Products	10	0.1	10	10	t ⁴	t ³
Total	10,680	100.0	1,370	57,710	100.0	7,340

¹ Includes all camping except that on Department sites.

² Includes all picnicking except that on Department sites.

³ t < 5.

⁴ t < 0.05%.

Table 60. Estimates of recreational use for the Moreau 50 access, Moreau river, August 24, 1986 to August 22, 1987. At the 67 percent level of probability the actual number of visits or hours will lie within one standard error of the estimate (plus or minus).

Activity	<u>Visits</u>			<u>Hours</u>		
	Number	Percent	Standard Error \pm	Number	Percent	Standard Error \pm
Trotline, Sport	610	14.1	230	14,530	43.6	5,430
Hoopnet	400	9.2	130	9,650	29.0	3,170
Angling (Pole & Line)	2,540	58.4	340	7,580	22.7	1,060
Swimming	790	18.2	140	1,550	4.7	330
Boating	440	10.2	90	890	2.7	190
Camping, Dept. Sites	50	1.2	20	880	2.6	380
Passive Leisure	540	12.5	60	590	1.8	80
Trapping	20	0.5	10	560	1.7	260
Trotline, Comm.	20	0.5	20	540	1.6	540
Camping, Other Sites ¹	20	0.5	20	390	1.2	390
Picnicking, Dept. Sites	160	3.7	60	320	1.0	140
Squirrel Hunting	90	2.1	30	280	0.8	110
Sight-Seeing	320	7.4	40	270	0.8	50
Undifferentiated Use	100	2.3	40	220	0.7	100
Gathering Products	60	1.4	30	90	0.3	50
Frogging	20	0.5	20	90	0.3	90
Trammel Net	t ²	t ³	t ²	90	0.3	90
Floating	20	0.5	10	60	0.2	40
Hiking	30	0.7	20	30	0.1	20
Collecting Bait	30	0.7	10	10	0.1	10
Target Shooting	20	0.5	20	10	t ³	10
Total	6,280	100.0	510	38,630	100.0	4,860

¹ Includes all camping except that on Department sites.

² t < 5.

³ t < 0.05%.

Table 61. Distance travelled, by percentage, on the Missouri River by 19,986 recreationists on the A segment (river miles 0 - 144), August 24, 1986 to August 22, 1987.

Distance (Miles)	Howell Island ¹	Weldon Spring ¹	Colter's Landing ¹	Gasconade		Mokane ¹	Bonnots Mill ¹	Moreau 50 ¹	Other Sites		Total Interviews	
				Park ¹	Chamois ¹				Lower Section	Upper Section	Number	Percent
0	93.2	78.0	60.7	87.5	82.3	81.9	95.8	95.7	78.1	59.9	15,915	79.6
1	1.6	1.2	3.8	0.3	3.9	0.6	1.0	1.7	0.6	2.4	301	1.5
2	1.4	2.5	9.5	1.7	3.9	1.4	1.3	0.9	1.8	5.0	567	2.8
3	0.5	2.5	8.0	2.2	3.5	1.6	0.2	1.1	1.3	4.1	477	2.4
4	1.2	1.9	7.7	3.0	2.7	4.4	0.7	0.4	1.0	6.0	569	2.8
5	0.2	1.9	3.6	0.2	0.8	6.6	0.3	0.2	1.3	2.0	293	1.5
6	0.4	1.1	1.9	1.5	0.5	0.2	0.1		0.8	2.2	210	1.1
7	0.1	0.8	0.7	0.8	0.1		0.3		0.3	1.2	107	0.5
8	0.1	1.4	1.8	0.9	0.5				1.1	2.8	223	1.1
9		1.2				0.2			0.5		50	0.3
10	0.3	1.4	0.7	0.6	0.5	1.6			2.1	4.2	300	1.5
11-15	0.3	2.9	0.5	0.9	0.5	0.7	0.3		3.4	5.1	413	2.1
16-20	0.2	1.5	0.5	0.4	0.8	0.8			2.0	1.8	208	1.0
21-25	0.1	0.6	0.2						1.4	0.3	73	0.4
26-30	0.4	0.3							2.0	1.0	114	0.6
31-35	0.1	0.4							0.6	0.4	45	0.2
36-40		0.2	0.4						0.2	0.4	30	0.2
41-45									0.5	0.2	22	0.1
46-50									0.4	0.6	33	0.2
51-100		0.2							0.6	0.4	36	0.2
100+												
Total	2,325	2,873	1,227	2,400	753	976	1,844	1,121	2,904	3,563	19,986	100.0
Interviewed												

¹ Missouri Department of Conservation access site.

Table 62. Distance travelled, by percentage, for 19,986 recreationists interviewed on the A segment of Missouri River (river miles 0 - 144), confluence with the Mississippi River to Jefferson City, August 24, 1986 to August 22, 1987.

Distance (Miles)	Howell Island ¹	Weldon Spring ¹	Colter's Landing ¹	Gasconade Park ¹	Chamois ¹	Mokane ¹	Bonnots Mill ¹	Moreau 50 ¹	Other Sites		Total Interviews	
									Lower Section	Upper Section	Number	Percent
0-5	12.8	8.8	22.8	28.0	87.8	40.7	38.8	64.3	37.4	43.3	6,622	33.1
6-24	69.8	72.3	60.4	23.3	7.3	50.0	42.4	30.2	51.6	41.4	9,634	48.2
25-49	15.4	16.6	12.1	27.9	3.2	6.7	11.1	1.4	7.1	10.1	2,529	12.7
50-99	0.9	0.4	3.7	20.2	1.2	0.4	7.1	1.5	2.9	2.7	904	4.5
100-249	0.8	0.7	0.7	0.5	0.4	1.2	0.6	2.3	0.5	0.6	146	0.7
250-499	0.1	0.3	0.2	0.3					0.1	0.9	55	0.3
500-999	0.2	0.4			0.1				0.2	0.7	50	0.3
1,000+		0.6	0.1			1.0		0.2	0.2	0.3	46	0.2
Total	2,325	2,873	1,227	2,400	753	976	1,844	1,121	2,904	3,563	19,986	100.0
Interviewed												

¹ Missouri Department of Conservation access site.

Table 63. Percentage age and sex composition of 18,875 recreationists interviewed by season on the A segment of Missouri River (river miles 0 - 144), August 24, 1986 to August 22, 1987.

Season	<u>Age Brackets</u>								Number of Recreationists Interviewed	
	Under 12	12-15	16-17	18-24	25-34	35-44	45-64	65+	Total	Percent
<u>Male</u>										
Fall	3.8	3.2	2.3	10.2	19.2	17.0	14.3	7.9	4,691	
Winter	2.3	2.3	1.6	9.4	21.5	21.9	15.3	9.8	971	
Spring & Summer	5.5	3.9	1.8	9.9	19.3	14.1	11.4	6.1	8,458	
Total									14,120	
Percent	4.8	3.6	2.0	10.0	19.6	15.5	12.6	6.9		74.8
<u>Female</u>										
Fall	2.4	1.0	0.9	4.3	4.9	3.9	2.9	1.8	1,322	
Winter	1.1	1.4	0.3	4.1	4.6	2.9	1.0	0.5	184	
Spring & Summer	3.6	2.3	1.3	6.0	6.7	4.2	2.6	1.1	3,249	
Total									4,755	
Percent	3.1	1.8	1.1	5.3	6.0	4.0	2.6	1.3		25.2
<u>Male and Female Combined</u>										
Fall	6.2	4.2	3.2	14.5	24.1	21.0	17.2	9.7	6,013	
Winter	3.5	3.7	1.8	13.4	26.1	24.9	16.4	10.3	1,155	
Spring & Summer	9.1	6.1	3.1	15.9	26.4	18.3	14.0	7.2	11,707	
Total									18,875	
Percent	7.8	5.4	3.0	15.3	25.6	19.5	15.2	8.2		100.0

Table 64. Percentage permit and non-permit composition of 19,993 recreationists interviewed on the A segment of Missouri River (river miles 0 - 144), August 24, 1986 to August 22, 1987.

Category	Howell Weldon Colter's Gasconade					Bonnots Moreau			Other Sites		Total Interviews		
	Island ¹	Spring ¹	Landing ¹	Park ¹	Chamois ¹	Mokane ¹	Mill ¹	50 ¹	Lower	Upper	Section	Number	Percent
Fishing Permit	15.6	19.0	12.5	15.1	4.5	35.3	22.0	35.4	8.8	4.8		3,034	15.2
Hunting Permit	0.9	2.3	0.2		0.1	1.2		1.9	0.6			140	0.7
Combination Permit	24.4	24.2	37.5	40.3	39.7	0.2	34.7	7.4	12.3	14.0		4,579	22.9
Resident Commercial Permit	0.3	1.9	0.2	2.9	0.5	6.8	1.5	5.1	3.7	4.2		545	2.7
Non-Resident Commercial Permit		0.1				0.2						4	0.1
Non-Resident Fishing Permit	0.3	0.3	0.4	0.1	0.1				0.1			26	0.1
Trip Permit	0.2	0.2	1.0	1.8	1.2				0.2	0.1		82	0.4
Non-Resident Hunting Permit													
Free	5.3	6.5	10.4	16.6	35.9	12.8	19.2	14.6	2.6	6.3		2,049	10.2
Total (Permit)	47.0	54.4	62.1	76.8	82.1	56.6	77.4	64.4	28.3	29.4		10,459	52.3
No Response	53.0	45.6	37.9	23.2	17.9	43.4	22.6	35.6	71.7	70.6		9,534	47.7
Total Interviewed	2,325	2,873	1,227	2,420	753	976	1,844	1,121	2,891	3,563		19,993	
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0

¹ Missouri Department of Conservation access site.

Table 65. Estimated total recreational use in visits and hours for the 553-mile study area of the Missouri River, by years.

	Visits	Visits		Hours	Hours	
		per Acre ¹	per Mile		per Acre ¹	per Mile
Year 1 August 28, 1983 to August 25, 1984	490,570	6	887	2,487,050	31	4,497
Year 2 August 26, 1984 to August 24, 1985	845,070	10	1,528	4,298,410	53	7,773
Year 3 August 25, 1985 to August 23, 1986	648,530	8	1,173	3,388,490	42	6,127
Year 4 August 24, 1986 to August 22, 1987	537,080	7	971	2,443,520	30	4,419

¹ Includes all land and water area (81,482 acres) in the study area.

Table 66. Estimated net consumer's surplus (C.S.) values for the B segment of Missouri River (miles 144-260), August 28, 1983 to August 25, 1984.

Recreation User Group	Estimated Total Visits	Consumer's Surplus per Trip	Annual Net Consumer's Surplus	C.S. per Mile	C.S. per Acre
All Activities	98,344	\$4.13	\$406,160	\$3501	\$22.87
Consumptive					
Activities	45,586	3.01	137,214	1182	7.72
Non-Consumptive					
Activities	52,742	4.03	212,552	1832	11.96
Angling	23,925	1.75	41,870	360	2.35
Trot Lining	9,452	1.96	18,526	159	1.04
All Fishing	36,458	2.57	93,697	807	5.27
Waterfowl					
Hunting	4,568	4.18	19,097	164	1.07
Boating	6,747	3.03	20,444	176	1.15
Loafing	16,326	2.50	40,816	351	2.29
Sight Seeing	15,598	3.57	55,685	480	3.13

Table 67, Cont'd.

Location & Author	Years of Study	Fishing (Includes Pole & Line Angling, Set Lines, & Giggling)		
		Visits per Acre	Hours per Acre	Average per Year
Huzzah Creek (Fleener, 1971c) (Fleener, 1974b)	10 5	42 39	187 135	
Courtois Creek (Fleener, 1975) (Fleener, 1974c)	10 5	43 35	147 113	
Current River (Fleener, 1971b) (Fleener, 1973)	9 3	8 4	32 12	
Big Piney River (Fleener, Funk, & Robinson, 1974)	8	24	33	
(Fleener, 1974a)	10	12	65	
Niangua River (Funk & Fleener, 1966)	12		37	

APPENDICES

Appendices A-N: Assigned station weights and probabilities.

- A. Lower section of B segment, Missouri River, August 28, 1983 to March 10, 1984.
- B. Lower section of B segment, Missouri River, March 11 to August 25, 1984.
- C. Upper section of B segment, Missouri River, August 28, 1983 to March 10, 1984.
- D. Upper section of B segment, Missouri River, March 11 to August 25, 1984.
- E. Lower section of C segment, Missouri River, August 26 to December 22, 1984.
- F. Lower section of C segment, Missouri River, December 23, 1984 to August 24, 1985.
- G. Middle section of C segment, Missouri River, August 26 to December 22, 1984.
- H. Middle section of C segment, Missouri River, December 23, 1984 to March 9, 1985.
- I. Middle section of C segment, Missouri River, March 10 to August 24, 1985.
- J. Upper section of C segment, Missouri River, August 26, 1985 to August 24, 1985.
- K. Lower section of D segment, Missouri River, August 25, 1985 to August 23, 1986.
- L. Upper section of D segment, Missouri River, August 25, 1985 to August 23, 1986.
- M. Lower section of A segment, Missouri River, August 24, 1986 to August 22, 1987.
- N. Upper section of A segment, Missouri River, August 24, 1986 to August 22, 1987.

Appendix O. Assigned time of day probabilities.

Appendix P. Recreational use survey interview schedule for one week.

Appendix Q. Recreational use sampling interview form.

Appendix A. Assigned station weights and probabilities for the lower section¹ of the B segment of Missouri River, August 28, 1983 to March 10, 1984.

Station No.	Location	Weight	Probability	Range
1	Marion (Dept.) ²			
2	Wilton Area	3	0.231	1-231
3	Easley and Big Bonne Femme	5	0.384	232-615
4	Little Bonne Femme	2	0.154	616-769
5	Providence (Dept.) ²			
6	Taylors Landing (Dept.) ²			
7	Franklin Island (Dept.) ²			
8	Boonville Sand Plant	2	0.154	770-923
9	DeBourgmont (Dept.) ²			
10	Jameson Island	$\frac{1}{13}$	$\frac{0.077}{1.000}$	924-1000

¹ River miles 144-213.

² Sampled independently.

Appendix B. Assigned station weights and probabilities for the lower section¹ of the B segment of Missouri River, March 11 to August 25, 1984.

Station No.	Location	Weight	Probability	Range
1a	Cedar Creek	2	0.134	1-134
1	Marion (Dept.) ²			
2	Wilton Area	3	0.200	135-334
3	Easley and Big Bonne Femme	5	0.330	335-664
4	Little Bonne Femme	1	0.068	665-732
5	Providence (Dept.) ²			
6	Taylors Landing (Dept.) ²			
7	Franklin Island (Dept.) ²			
8	Boonville Sand Plant	3	0.200	733-932
9	DeBourgmont (Dept.) ²			
10	Jameson Island	$\frac{1}{15}$	$\frac{0.068}{1.000}$	933-1000

¹ River miles 144-213.

² Sampled independently.

Appendix C. Assigned station weights and probabilities for the upper section¹ of the B segment of Missouri River, August 28, 1983 to March 10, 1984.

Station No.	Location	Weight	Probability	Range
1	Glasgow Quarry	1	0.037	1-37
2	Bluffport	2	0.074	38-111
3	Stump Island	12	0.445	112-556
4	Lewis Mill (Little Chariton)	4	0.148	557-704
5	Slater Wells	1	0.037	705-741
6	Mouth of Chariton River (Catfish City)	1	0.037	742-778
7	Palmer Creek	6	0.222	779-1000
8	Brunswick (Dept.) ²	<u>27</u>	<u>1.000</u>	

¹ River miles 213-260.

² Sampled independently.

Appendix D. Assigned station weights and probabilities for the upper section¹
of the B Segment of Missouri River, March 11 to August 25, 1984.

Station No.	Location	Weight	Probability	Range
1	Glasgow Quarry	1	0.036	1-36
2	Bluffport	1	0.036	37-72
3	Stump Island	12	0.428	73-500
4	Lewis Mill (Little Chariton)	5	0.178	501-678
5	Slater Wells	1	0.036	679-714
6	Mouth of Chariton (Catfish City)	1	0.036	715-750
7	Palmer Creek	6	0.214	751-964
8	Brunswick Access (Dept.) ²			
9	Below Brunswick Grain Terminal	$\frac{1}{28}$	$\frac{0.036}{1.000}$	965-1000

¹ River miles 213-260.

² Sampled independently.

Appendix E. Assigned station weights and probabilities for the lower section¹ of the C segment of Missouri River, August 26 to December 22, 1984.

Station No.	Location	Weight	Probability	Range
1	Miami Riverfront Park (Dept.) ²			
2	Grand pass (Dept.) ²			
3	Two miles N.E. of Grand pass	2	0.053	1-53
4	Waverly Ramp	2	0.053	54-106
5	Crooked River (Cutoff Slough)	8	0.210	107-316
6	Crooked River 3/4 mi. S of Hardin	6	0.158	317-474
7	Lexington State Park	7	0.184	475-658
8	Sunshine Lake lower end (N)	8	0.210	659-868
9	Sunshine Lake upper end (S)	<u>5</u>	<u>0.132</u>	869-1000

¹ River miles 260-322.

² Sampled independently.

Appendix F. Assigned station weights and probabilities for the lower section¹ of the C segment of Missouri River, December 23, 1984 to August 24, 1985.

Station No.	Location	Weight	Probability	Range
1	Miami River front Park (Dept.) ²			
2	Grand Pass Area (Dept.) ²			
3	Gumbo Bottom	2	0.069	1-69
4	Waverly Ramp	2	0.069	70-138
5	Crooked River (Cutoff Slough)	2	0.069	139-207
6	Crooked River 3/4 mi. S of Hardin	4	0.138	208-345
7	Lexington State Park	10	0.345	346-690
8	Sunshine Lake Lower End (N)	8	0.276	691-966
9	Sunshine Lake Upper End (S)	$\frac{1}{29}$	$\frac{0.034}{1.000}$	967-1000

¹ River miles 260-322.

² Sampled independently.

Appendix G. Assigned station weights and probabilities for the middle Section¹ of the C segment of Missouri River, August 26 to December 22, 1984.

Station No.	Location	Weight	Probability	Range
1	Sni River, Wellington	1	0.036	1-36
2	Sibley Access	4	0.143	37-179
3	Mouth of Little Blue	7	0.250	180-429
4	LaBenite Park	15	0.535	430-964
5	Mo. River Boating Assn.	$\frac{1}{28}$	$\frac{0.036}{1.000}$	965-1000

¹ River miles 322-372.

Appendix H. Assigned station weights and probabilities for the middle Section¹ of the C segment of Missouri River, December 23, 1984 to March 9, 1985.

Station No.	Location	Weight	Probability	Range
1	Sni River (Wellington)			
2	Sibley Access	3	0.120	1-120
3	Mouth of Little Blue river	7	0.280	121-400
4	La Benite park	15	0.600	401-1000
5	Mo. River Boating Association	<u>25</u>	<u>1.000</u>	

¹ River miles 322-372.

Appendix I. Assigned station weights and probabilities for the middle section¹ of the C segment of Missouri River, March 10 to August 24, 1985.

Station No.	Location	Weight	Probability	Range
1	Sni River (Wellington)			
2	Sibley Access	3	0.116	1-116
3	Mouth of Little Blue River	8	0.309	117-424
4	La Benite Park	15	0.576	425-1000
5	Mo. River Boating Association			

¹ River miles 322-372.

Appendix J. Assigned station weights and probabilities for the upper section¹ of the C segment of Missouri River, August 26, 1984 to August 24, 1985.

Station No.	Location	Weight	Probability	Range
1	Parkville Ramp	3	0.111	1-111
2	Schimmel City Access (Dept.) ²			
3	Leavenworth park	12	0.445	112-556
4	Weston Bend State Park	2	0.074	557-630
5	Atcheson, Independence park	<u>10</u> 27	<u>0.370</u> 1.000	631-1000

¹ River miles 372-423.

² Sampled independently.

Appendix K. Assigned station weights and probabilities for the lower section¹ of the D segment of Missouri River, August 25, 1985 to August 23, 1986.

Station No.	Location	Weight	Probability	Range
1	Wathena Ramp			
2	St. Joseph Boat Club ²			
3	Flathead Catfish Club ²			
4	Al's Marina	60	0.600	1-600
5	Worthwine Island (Dept.) ³			
6	Nodaway Island (Dept.) ³			
7	Godfrey Payne Access (Dept.) ³			
8	White Cloud Ramp	$\frac{40}{100}$	$\frac{0.400}{1.000}$	601-1000

¹ River miles 423-488.

² Complete information obtained from cooperators.

³ Sampled independently.

Appendix L. Assigned station weights and probabilities for the upper section² of the D segment of Missouri River, August 25, 1985 to August 23, 1986.

Station No.	Location	Weight	Probability	Range
1	Rulo	30	0.300	1-300
2	Peterson Barge Terminal	10	0.100	301-400
3	Thurnau State W.A. (Dept.) ²			
4	Indian Cave State Park ³			
5	Hoot Owl Bend (Dept.)	20	0.200	401-600
6	Langdon Bend Access (Dept.) ²			
7	Brownsville State River Area	40	0.400	601-1000
8	Watson Access (Dept.) ²			
		<u>100</u>	<u>1.000</u>	

¹ River miles 488-553.

² Sampled independently.

³ Complete information obtained from Park Superintendent.

Appendix M. Assigned station weights and probabilities for the lower section¹ of the A segment of Missouri River, August 24, 1986 to August 22, 1987.

Station No.	Location	Weight	Probability	Range
1	367 Highway Bridge			
2	Halls Ferry	4	0.200	1-200
3	Blanchette Landing	7	0.350	201-550
4	Riverside, St. Charles Rock. Rd.	9	0.450	551-1000
5	Howell Island ²			
6	Weldon Spring ²			
		<u>20</u>	<u>1.000</u>	

¹ River miles 0-65.

² Sampled independently.

Appendix N. Assigned station weights and probabilities for the upper section¹ of the A segment of Missouri River, August 24, 1986, to August 22, 1987.

Station No.	Location	Weight	Probability	Range
1	Washington Ramp	15	0.750	1-750
2	Colter's Landing ²			
3	Hermann Ramp	3	0.150	751-900
4	Gasconade Park ²			
5	Chamois ²			
6	Mokane ²			
7	Bonnots Mill ²			
8	Moreau 50 ²			
9	Jefferson Landing	$\frac{2}{20}$	$\frac{0.100}{1.000}$	901-1000

¹ River miles 65-144.

² Sampled independently.

Appendix O. Assigned time of day probabilities for all study segments of Missouri River for the fall, winter and spring periods August 28, 1983 to August 22, 1987.

Period and Segment	Time of Day	Probability	Range
Fall:			
August 28 to December 24, 1983 (B segment)	A: 0000-0800	0.03	1-3
August 26 to December 22, 1984 (C segment)	B: 0800-1600	0.60	4-83
August 25 to December 21, 1985 (D segment)	C: 1600-2359	0.37	84-100
August 24 to December 20, 1986 (A segment)			
Winter:			
December 25, 1983 to March 10, 1984 (B segment)	A: 0000-0800	0.01	1
December 23, 1984 to March 9, 1985 (C segment)	B: 0800-1600	0.90	2-91
December 22, 1985 to March 8, 1986 (D segment)	C: 1600-2359	0.09	92-100
December 21, 1986 to March 7, 1987 (A segment)			
Spring and summer:			
March 11 to August 25, 1984 (B segment)	A: 0000-0800	0.05	1-5
March 10 to August 24, 1985 (C segment)	B: 0800-1600	0.55	6-60
March 9 to August 23, 1986 (D segment)	C: 1600-2359	0.40	61-100
March 8 to August 22, 1987 (A segment)			

Appendix P. Recreational use survey interview schedule for one week at the Taylors Landing Department of Conservation access site, B segment of Missouri River, September 25 to October 1, 1983. Letters indicate time of day that interviews were to be conducted (see Appendix O).

Day	Time of Day
Sept. 25	C
26	B
27	
28	
29	
30	B
Oct. 1	

[illegible]

Appendix Q. Missouri River recreational use survey form.

Date: _____														
Sheet No.: _____														
Time of Day: _____														
Check: _____														
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